

The Iron Age

A Review of the Hardware, Iron and Metal Trades.

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An Annealing Furnace for Small Articles.

In the report of the Chief of Ordnance for the year 1880, Lieut.-Col. Whittemore describes an annealing furnace used at the Frankford Arsenal for annealing copper and brass shells, cannon-primer tubes, &c. As the furnace is well designed, and, as will be seen, has proved very successful for its special object, it will no doubt prove of value in many branches of manufacture, where similar operations must be daily repeated with a large quantity of small articles. Lieut.-Col. Whittemore has reported as follows: It consists of the furnace proper, constructed of boiler iron, lined with fire-bricks, and arranged with flue and cold blast for draft and heat; of an annealing retort, cylindrical in shape, with closed ends of hemispherical form. From these ends project trunnions, which revolve on friction rolls attached to the furnace. The left trunnion, looking toward the furnace, is hollow, and subserves several useful purposes. It is a peep hole for observing the degree of heat to which the charge is being raised, an outlet for the smoke into which the oil on the shells is converted, a means of obtaining samples for test, and of emptying the charge when sufficiently annealed. The annealing accomplished in this tight-jointed receptacle possesses several advantages over the old plan. In the latter the cylindrical vessel used was pierced with holes and revolved with its charge over a charcoal fire. The surface of the shells became considerably oxidized from exposure to the atmosphere and took up some dirt, as ashes from exterior surroundings, during the process. By the new plan the charge is protected from the direct action of the fire, and the gases and smoke generated and expanded inside the retort flow out through the hollow trunnion. By the old method charcoal was necessary as a fuel, to guard against the sulphur and other gases which would be generated from burning anthracite coal. Anthracite coal is used with the new retort, and the shells are annealed with less oxidation of their surfaces, and consequently require less pickling and cause less wear upon machinery and tools in the continued process of drawing. Ten thousand shells or thirty thousand cannon-primer tubes is a full charge for the retort. From 180,000 to 200,000 shells can be annealed in one day of 10 hours, at an expense of about \$5.25. An equal number by the old method would take 3 days and 6 hours, at an expense of about \$18.75. New process—amount of anthracite coal consumed in annealing 180,000 shells = 600 pounds, at a cost of \$1.50. Old process—15 barrels charcoal at 35 cents = \$5.25. A crane takes the retort from the furnace and deposits it upon a cradle, from which it is readily emptied. The retort, with full charge, weighs about 600 pounds. The furnace has a hinged wrought-iron cover, which is lowered over the retort during the operation of annealing, and raised when the retort is removed, and a hinged flue, which fits into an opening in the cover, connecting it with the draft. The accompanying drawing shows the general construction and operation of the furnace, which was designed by Mr. Jabez H. Gill, master machinist at Frankford Arsenal.

SCIENTIFIC AND TECHNICAL.

Referring to Prof. Thurston's recent experiments with copper-tin alloys, the Engineer makes some very interesting statements concerning an alloy called "NAVAL BRASS."

It appears that in the early part of 1874, in consequence of numerous cases of failure in respect to Muntz metal in ships of the Royal Navy, the attention of the Admiralty was drawn to the subject, and they directed inquiry to be made as to the cause of these failures. Mr. Farquharson, to whom the matter was referred, found that the causes of decay which had been suggested would not account for that which actually took place. In the numerous cases which came under his notice, two conditions of use were always observable, namely, salt water and contact with an electro-negative metal—a fact which pointed strongly to electro-chemical action as the cause of the change. On the other hand, there was a total absence of surface-pitting. To the eye the surface of affected bolts was as smooth and perfect as when they were first made. It was difficult to understand how an internal change, such as actually took place, could come to pass in the way inferred. Fortunately, a very simple expedient proved beyond doubt that salt water had penetrated an apparently sound and close metal, and the mystery was thus dispelled. Bolts, 3/4 inches in diameter, which had been used for securing propeller blades, were shown to have been thus penetrated to the center. In view of these facts, the conclusion that a portion of the zinc had been dissolved out was inevitable, and this explanation has been thoroughly verified by comparing analyses of affected and unaffected parts of the same bolts. The circumstance that no such change was to be found in any of the numerous varieties of gun-metal, rendered it probable that it was peculiar to alloys of copper and zinc, so that a forgeable metal could be produced with tin in its composition, having the requisite strength and ductility, the alloy thus formed would be free from the

Siemens again called attention to his proposal to manufacture

HEATING GAS

at the same time that illuminating gas is made. His suggestion consists in providing over each bench of retorts two collecting pipes, the one being set aside for illuminating, and the other for a separate service of heating gas. The gas coming from a retort varies greatly in its character during progressive periods of the charge. During the first quarter of an hour after closing the retort the gas given off consists principally of marsh gas (CH_4) and other occluded gases and vapors, which are of little or no use for illuminating purposes; from the end of the first quarter of an hour, for a period of two hours, rich hydrocarbons, such as acetylene (C_2H_2) and olefiant gas (C_2H_4) are given off; whereas the gas passing away after this consist for the most part again of marsh gas, possessing low illuminating power. M. Ellissen, the late chief of the experimental department of the Paris Gas Works, and actual President of the French Society of Gas Engineers, has made a most interesting series of experiments, which he carried out in connection with the late M. Regnault, the eminent physicist, some years ago; the object of the experiments being to discover the proper period of time to be allowed for each charge. Although the average illuminating power produced by the distillation of the coal did not exceed 13.5 standard candles, the gas given off from the end of the first quarter of an hour, during a period of two hours, possessed an illuminating power of 16.16 standard candles.

According to the figures given in the valuable experiments of M. Ellissen, it appears that nearly two-thirds of the total production of gas takes place in the above period, while the remaining third is distilled during the first quarter of an hour and the last hour and three-quarters. It hence follows that by changing the direction of the flow of gas at the periods indicated, allow-

of 500 pounds and upward to the square inch, and, as a matter of course, are exceedingly light.

German physicians and builders after a series of practical tests speak very highly of the properties of

TRIPOLITH,

a substance manufactured to replace plaster of Paris for surgical operations, and for stucco plaster and other work in the building trades. It is manufactured by Messrs. Gebrüder von Schenk, of Heidelberg, and is remarkable for the rapidity with which it sets, its lightness, strength and polish. It is said to resist the action of water very well. It is made of impure gypsum, three parts of which are ground together with one part of silicate of lime, nine parts of the mixture being ground together with one part of coke. The material is then heated and stirred, without the addition of water, at a temperature of 248° F. As soon as the water of crystallization of the gypsum has been expelled the temperature is raised to 500° F., the product being a gray powder. The color of the dry mass is silver gray, and besides setting in a pure state in four to five minutes, it can be made to harden after five to six hours by the addition of water in which some glue has been dissolved. By comparative test it was found that after setting, it took plaster of Paris 147 hours longer to dry than tripolith. The latter is also 14 to 16 per cent. lighter, an important advantage for surgical operations and for use in stucco work. After it has been given a coat of oil it holds color very well. As it grows older, set tripolith becomes firmer.

Plaster of Paris has a tensile strength of 7 to 8.25 tons per square inch, while a sample of tripolith, after two months, had a tensile strength of 15.2; after four months, 15.91; after six months, 17.5, and after eight months 17.5 tons per square inch. It is reputed to be 30 per cent. cheaper than plaster of Paris.

It is reported that Krupp, of Essen, has succeeded in making

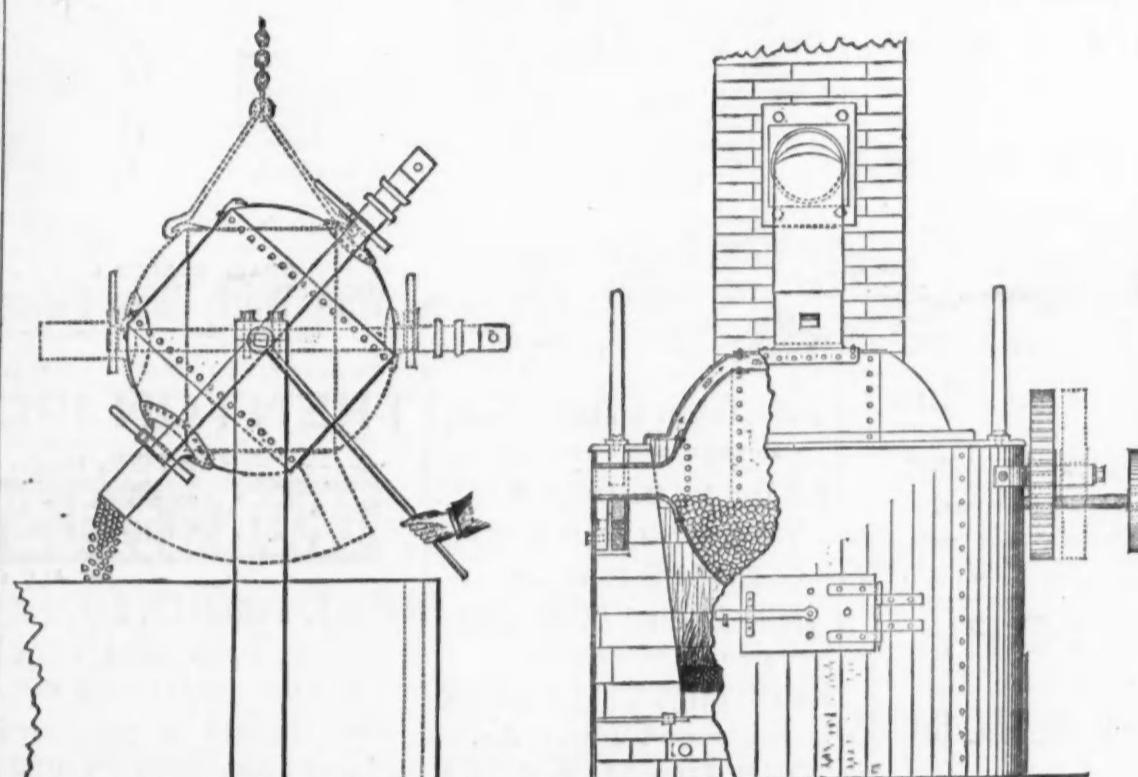
that its internal capacity is the same throughout its entire depth. At the upper part of the said reservoir is fixed, in a vertical position or nearly so, a dial or clock face, through the center of which passes, in such a manner as to be capable of turning freely, a spindle, to one end of which is fixed a hand for indicating the time, and on the opposite end is mounted a small pinion. A float is placed within the oil reservoir, and to the top thereof is attached a rod fixed vertically, the upper end having a rack thereon which gears into the before-mentioned pinion. The wick holder is arranged in any suitable manner at the upper end of the reservoir, and when the clock face is transparent, it is placed behind the same, thus effecting the double purpose of illuminating the said clock face and also of modifying the light; the wick passes through an aperture or space in or at the side of the float or in any other suitable manner to the oil. The action of the apparatus above described is as follows: It having been ascertained that a certain quantity of oil will be consumed in a certain time, and that consequently the float will descend a certain distance with the alteration in the level of the oil, the rack and pinion are so formed that on the rod descending with the float the pinion will be caused to revolve, and with it the hand, which will indicate on the clock face a period of time corresponding to that occupied in the consumption of the quantity of oil referred to. When the lamp is lighted the hand may be moved to the exact time by putting the rack out of gear with the pinion and turning the hand round.

Judge Blatchford, of the United States Circuit Court of the Northern District of New York, has recently rendered a decision in the case of Andrews vs. Cross, which involved the validity and use of the Green driven well patent. The claim for a process of constructing wells "by driving or forcing an instrument into the ground until it is projected into the water without removing the

earth upward" does not merely include the driving of the tube, but also the employment of a pump attached to the tube to cause the flow of water when the well is a new-flowing well. The patent has been infringed even though the person using the well and the pump and the process may not be the person who caused the rod to be driven, the hole to be made, the tube to be inserted or the pump to be attached. Judge Blatchford holds that a patent is not valid if the inventor does not know or does not set forth the scientific principle of his invention, a plea which was made against the Green patent.

The Hardening of Steel.

The tempering of steel is a question which is attracting considerable attention at the present time, especially the relation between the metal and the gases which come into contact with it during the process of manufacture. An interesting communication on the subject was recently made to the Physical Society by Prof. Chandler Roberts, of the Royal School of Mines, and his principal result, though of a negative kind, is valuable as narrowing the question at issue. Prof. Roberts began by tracing the history of our knowledge concerning the carburization of iron, from the work of Clonet, at the end of last century, to that of Marguerite in 1856. Marguerite showed that, although the conversion of iron into steel could be effected by contact with carbon, even in the diamond form, it is, nevertheless, true that carbonic oxide ordinarily plays a considerable part in the process. Graham's paper "On the Occlusion of Gases," read in 1867, gave singular point to this conclusion by showing that carbonic oxide can penetrate to the center of a mass of iron. This gas is, in fact, introduced into the iron at a comparatively low temperature, while a high temperature is necessary to enable the metal to appropriate the carbon in order to become steel. The effect of occluded gases in iron and steel is now being carefully studied by metallurgists in general, and a committee of the Institution of Mechanical Engineers recently raised the question in one of their reports, as to whether the hardening and tempering of iron and steel might not be produced by the expulsion of occluded gases during the heating process, and their subsequent exclusion by the sudden cooling and contraction. Prof. Roberts has undertaken to answer this question, and by heating rods and spiral wires of steel *in vacuo* by means of the electric current and suddenly quenching them in cool mercury, he demonstrates that steel will harden when there are no gases to absorb. The metal was, of course, robbed of its occluded gases by means of an air pump connected to the vacuum chamber, and the parts which were quenched in the mercury were found to be glass-hard, while those which did not reach the cold fluid were found to be quite soft. Prof. Roberts, therefore, concluded that gases do not play any part in the process of hardening and tempering. Historically interesting are the facts mentioned by Prof. Roberts, that as early as 1781 Bergman clearly stated that fixed air could give up its carbon to iron, and that Reaumur in 1722 actually employed the Torricellian vacuum in experiments on the tempering of steel, the metal being placed red hot in a highly-rarefied atmosphere, thereby anticipating the methods of to-day by more than 150 years. An interesting discussion followed the reading of the paper. Prof. Hughes, who has made numerous experiments on the subject, expressed his opinion that the temper of steel was due to the chemical union of the iron with the carbon. At low temperatures this union takes place only in a slight degree, and hence in soft steel we have the carbon keeping aloof from the iron; but as the temperature is raised the combination is furthered, until in the case of gray or glass hard steel we have really a kind of diamond alloyed with iron. Sudden cooling is necessary to fix the combination, for in slow cooling the carbon separates out again from the iron. This theory is a very promising one, and is supported by a variety of facts; Mr. Stroh, for example, having observed that when an electric spark passes between two iron contact pieces and fuses them, the fused part becomes diamond-hard and will scratch a tile. Recent researches by Mr. T. W. Hogg have also led him to a similar conclusion, namely, that temper of steel is due to the presence of an unstable compound of iron and carbon. The theory might very well be tested by chemical analysis in order to see whether the proportion of carbon appropriated by the metal increased with the temperature, or if any change took place in the refractive index of the steel. It was generally agreed by all the speakers at the meeting that the color of the surface of tempered steel depends on the temperature, and is due to the thickness of the film or skin of oxide; the blue film signifying a higher temperature than the yellow, as well as a thicker coating. In this connection Prof. Hughes has demonstrated that the electric resistance of the film increases with the temperature. A novel illustration of metallic skins was furnished by Prof. Guthrie, who exhibited a steel chain to which he had given a beautiful bluish-black protective coating by simply dipping it in melted nitrate of potash or common niter. The process was discovered accidentally, and as the bloom improves the appearance of the metal, it will probably be applied to utensils of iron and fancy articles.



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Improved Universal Force Pumps.

Mr. W. S. Blunt, whose name has been known to our readers for a long time in connection with the "Universal Force Pump," has recently brought out a number of new styles and has materially improved upon former patterns. The accompanying illustrations show some of these pumps which are worthy of notice. The first of them, Fig. 1, is a form of the pump called the "Lotus." It is a "cistern pump," suitable for use in all positions where a pump of this class is ordinarily placed, but having some additional advantages of its own. It is provided with a stop-cock on sink spout, which is a great convenience when forcing water through an upper nozzle. Fig. 4 shows another form of the same pump. In general the series of pumps bearing the name

via New York is \$6 per ton. Both these roads are a part of the Wabash combination.

The Tehuantepec Railroad.

Wm. J. McAlpine, consulting engineer of the Tehuantepec Inter-Ocean Railroad, has just returned to New York after four months' absence on the route, and speaks of this really grand enterprise, of which the public know comparatively little, as in full progress toward successful completion. Between 4000 and 5000 men are at work, of whom 3000 are on the northern end, where there are now 15 miles of finished road. As much more will be in operation in a few weeks. At the southern or Pacific end work was commenced in the middle of April last. We were favored by Mr. McAlpine with



Fig. 1.—The "Lotus" Short Standard Non-Freezing Set-Length Pump and Cylinder.

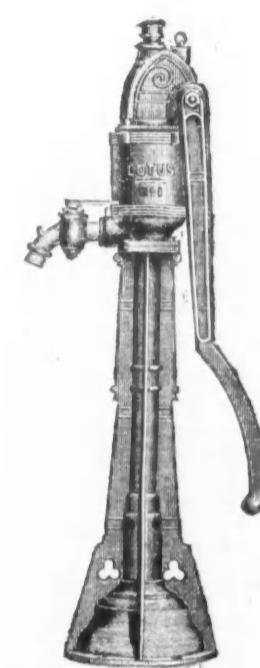


Fig. 2.—The "Lotus" Adapted to Use in Deep Wells.

"Lotus" may be described together. All of them are provided with a working head with an upper nozzle, which is intended to be used with hose or for pipe leading to a tank. The handle and interior crank are secured in a very simple but effectual manner in the head, which rests and rotates upon the air chamber, thus enabling the handle to be used with the pump in any desired position. The air chamber is so constructed as to be reliable at all times, and all parts of the pump are so adjusted that the water enters at the base of the pump, and passes up in a straight line and out of the upper nozzle on its way to the tank, thus avoiding unnecessary turns and consequent friction. A side spout is screwed into the air chamber for use at the kitchen sink, or for the attachment of hose for use at fires or irrigation. The external fittings, and a somewhat novel arrangement for disconnecting any portion of the pumps, their great length of stroke and unusual power, together with the finish given them and the durability of the parts, full information. He was asked how the prospects of the Tehuantepec route compare with the proposed Lesseps' canal or Eads' great ship canal, which secure so much more of public attention. Said he: "Two years from now we shall have the route through and in operation from ocean to ocean. Lesseps', it is said, will be finished in 10 to 20 years, and Eads' canal will be nearly or quite as long in building. Each of those works will cost not less than \$500,000,000, the annual interest of which would pay a dividend of 300 to 400 per cent. on the investment in the Tehuantepec railway, viz., \$6,000,000. Hence," said Mr. McAlpine, "competition between these works is out of the question." He added that if the traffic contemplated by the projectors of Eads' scheme is realized as to volume, two tracks on the Tehuantepec road would do the whole of it, and such two-track railroad would cost less than \$10,000,000, against the \$500,000,000 required for either of the other projects.

For those who are not familiar with that



Fig. 3.—Deep Well Non-Freezing Force Pump.

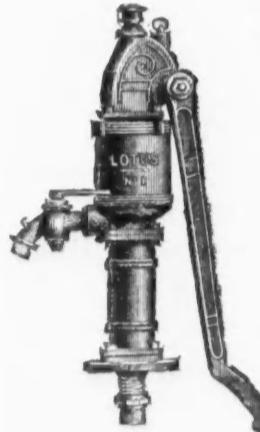


Fig. 4.—The "Lotus" Common Form, with Outlets for Pipe or Hose.

commend the pumps for general use. Fig. 2 shows a form of the "Lotus" adapted to use in deep wells. Fig. 3 shows a deep-well, non-freezing force pump having no air chamber. It has a rotating head and two nozzles. The small cuts to the right of Figs. 1 and 3 represent the cylinders which are used in connection with these pumps, and which are made in two styles. Purchasers have their choice between iron cylinders and cold-drawn brass cylinders. The general appearance of the two styles is the same, and both are furnished with polished raised brass valve seats. Mr. Blunt's place of business is 94 Beekman street, New York.

Eight carloads of railroad iron, the first of a lot of 8000 tons for the St. Louis, Des Moines and Northern and the Des Moines and Northwestern, purchased in Wales, arrived at Des Moines, Iowa, on the 20th ult., via New Orleans and Mississippi Barge lines, with through bills of lading from Liverpool, the first of the kind. A Des Moines dispatch to the Chicago Tribune says: The order was made by cable, and was necessitated because the mills in this country could not supply it, being overrun with orders. The saving on freight by this route over that

part of Mexico bordering on the Gulf, it may be observed that the Tehuantepec road (for which Mr. Edward Larned, of Pittsfield, Mass., obtained a full concession) will run very nearly north and south, the northern terminus being at the mouth of the Coatzacoalcos River, which is almost due south from New Orleans. Its length will be 160 miles, and the saving in distance between New York and San Francisco, compared with the Panama route, will be 1152 miles each way, or compared with the voyage around Cape Horn, 21,534 miles on the round trip. According to Mr. McAlpine, who has carefully surveyed the entire line, there are no unusual difficulties in building the road, as the grade nowhere exceeds 60 feet to the mile, and more than one-half of it is of the cheapest construction, nearly following the surface of the earth. The most expensive portion of it, and that extending a short distance only, will not exceed \$60,000 per mile, making an average for the whole of not more than \$25,000 or \$30,000 per mile.

So quietly has the work proceeded that many will be surprised to learn that no less than 33 cargoes of material have been shipped to the Coatzacoalcos River up to the present date, most of them from New York, though the rails go from England and about

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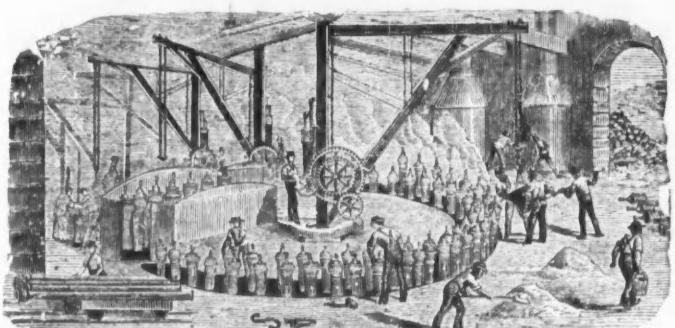
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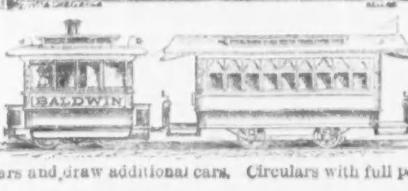
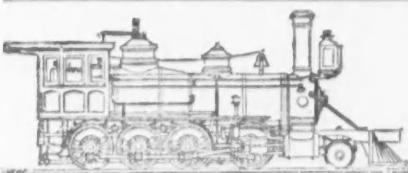
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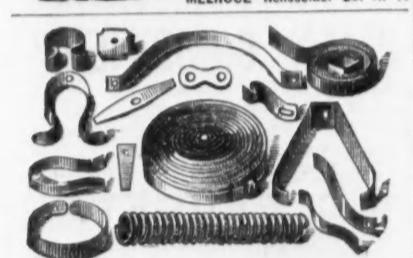
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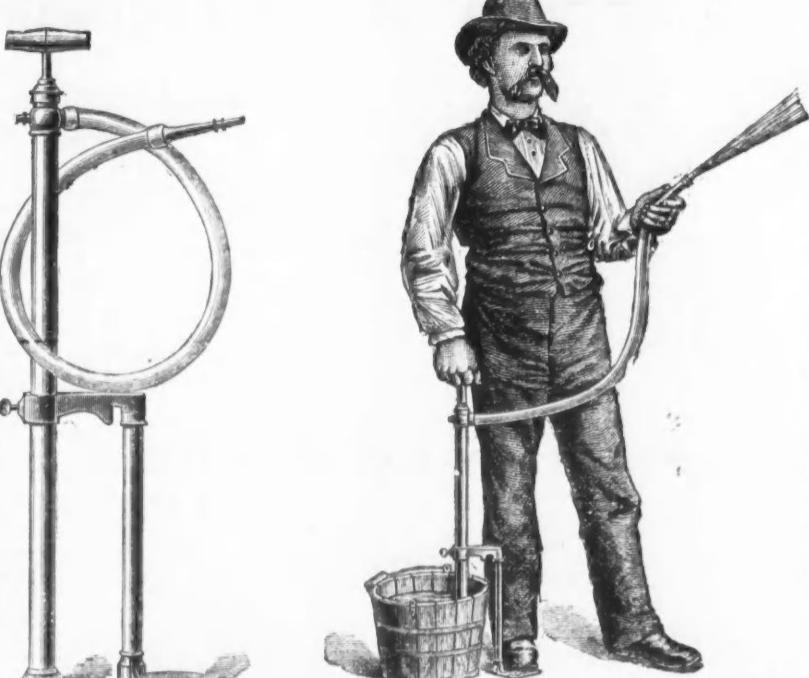
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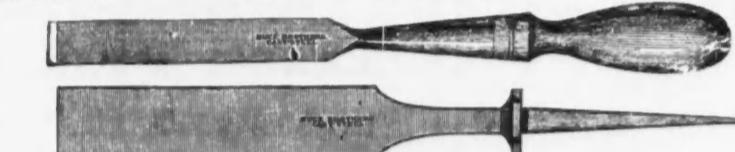
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Proxidate of Iron.	.83
Manganese Oxide.	.09
Alumina.	4.43
Lime.	1.52
Magnesia.	.97
Silica.	14.89
Phosphoric Acid.	.37
Sulphur.	.42
Titanic acid.	.87
Total.	99.44

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damental idea of this mode of construction and the advantages of the Büttgenbach system may be summed up as follows: The brickwork of the stack is quite independent of the lower blast furnace. Each ring or course of bricks constituting the hearth, crucible, boshes and stack is readily accessible, and is quite free from any outer casing or shell, except for a height of 3 or 4 feet at its widest part, below e , where the stack is supported by a circle of six arches.

The advantage of this construction is that it conduces to the duration of the furnace, for in case of need any injured part can be repaired, even when the furnace is running. The stack or mantle, and the upper part of the boshes, being cooled by the surrounding atmosphere, they remain in their natural condition without wear, and do not become unduly heated at any time, by which means they are kept in a perfect state of preservation. The hearth, crucible, and lower portion of the boshes, which are apt to suffer after a certain time from the destructive action of the melting materials, may be replaced without any difficulty while the work is going on; if the furnace is to be blown down, the lower part of the same can be completely taken away without injury to the stack. As each particular brick is accessible from without, the progress of corrosion by the heat can be easily ascertained and prevented by cooling them down with water, either by merely sprinkling them or by inserting water cooling boxes, or cooling rings and water tuyeres, so that the wear and tear is checked. The utilization of the waste gases can be so managed as to yield the greatest effect; the pillars which support the bridge are hollow, and can serve as gas pipes, when they carry the gases from the bell downward in an annular box of sheet iron around the base of the stack, at e , where they get in contact with a large body of water, and deposit any dust which they carry from the furnace mouth. The gases consequently reach their destination in a very purified condition, and may be utilized either in the blast-heating stoves or with the steam boilers. The arrangement of the water box allows of the withdrawal of dust and grit deposited there while in full run, and in the event of an explosion the large area of the only water locked open space acts like a gigantic safety valve and prevents any injurious effect. In point of fact, instead of dreading explosions, they are perfectly welcome from time to time, as they are quite harmless, and clear the pipes from any dust and grit that may cling to their inner sides. The gas pipes, being the supporters of the bridge, render it quite independent from the furnace proper without involving any special outlay. The furnaces are also provided with a closed hearth of special construction, which was introduced by Mr. Büttgenbach in 1867, and admits of any working or heating in the hearth of the furnace, if necessary, combining at the same time all the advantages of a closed breast. The hearth is closed in by a cast-iron tympan, placed in the usual position, the tympan being cooled by a current of water, which passes through a cooled pipe fixed in the cast iron. In the center of the tympan plate is an aperture or slit, nearly over its whole height, which may be tampered with ordinary clay, so that the upper portion of it is 2 or 3 inches higher than the central line of the tuyeres. Thus the slag, which ascends above the damstone, and reaches the level of the tuyeres, runs easily off through a cinder notch, which is driven in the slit by a light steel bar; and since the level of the notch may be altered at will, a means is afforded for changing the level over 24 inches, at which the slag is run off, while there is nothing to prevent the metal to be tapped at this same slit.

As we have already remarked, the performance of the Büttgenbach furnace has everywhere given great satisfaction.

It effected an economy of 10 to 15 per cent. of fuel, while the first outlay was of course very much below that for furnaces of the ordinary type. With good coke, excellent foundry pig No. 1 could be produced at the Neuss furnace from 35 per cent. ore, requiring only 110 pounds of fuel for 100 pounds of crude iron. During the year 1870-71 the same furnace had to be damped down for ten weeks, owing to the impossibility of providing it with coke, and when turned on again, it did its work with surprising regularity. Experience has shown that the walls of the furnace, being only 2 feet thick at the base, and 18 inches at the stack, are hardly at all affected by the internal heat, either through expansion or contraction. Hearth, boshes and stack were originally kept in the first furnace by means of flat-iron binders upon every third course of bricks. This precaution has, however, proved unnecessary, and in 1869 they were removed at the hearth and boshes, and partly at the stack, without the slightest inconvenience.

So much for the general peculiarities of the Büttgenbach furnace. We now continue to deal with the bad gobbing of the very first furnace of this type, 15 years after its construction. After the furnace had been blown down in 1876, it stood idle for nearly four years, and was blown in anew only in August, 1880, under a not at all competent, and, besides, reckless management. Already, in the fifth week after lighting, the furnace was completely gobbed up, from the bottom stone upward to 9 feet in the crucible and boshes; and as the manager had become quite helpless on September 25, Mr. Franz Büttgenbach was called in to help, when he found the walls between the original level of the tuyeres and the boshes, which had been from 3 to 4 feet thick, melted away to 6 or 8 inches and almost crumbled to pieces.

At this date the tuyeres had been gradually raised to about 9 feet above the bottom stone.

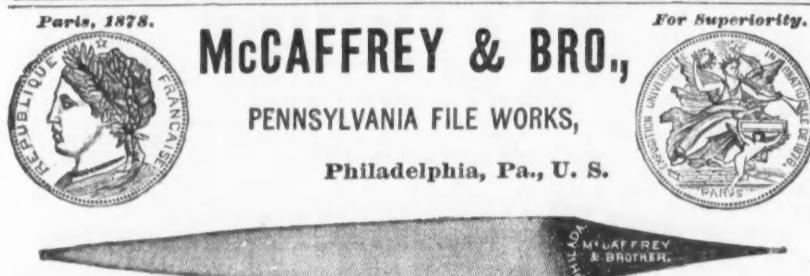
They were perfectly dark, while the crucible and hearth were filled up with a cold solidified mass, which seemed to drive the walls asunder in such a manner that they showed rents from 3 to 4 inches wide.

Above the tuyeres, however, white heat was still visible, and a thick, sticky cinder trickled down from there. Under these circumstances, it was out of the question to remove the obstructing masses. The only possibility to save the life of the furnace was to remove the cold gobbing by breaking it away, and to rebuild the corroded part of the furnace, which was carried out in the following manner:

All tuyeres were taken out and all apertures carefully closed, while the top was covered in air-tight by the valves in the gas pipes, and by the lid, which was well secured to the top. In this condition the furnace remained four days, when, after examination with a $\frac{1}{2}$ -inch steel drill, it was found that the walls as low as e , were still intact, without having even lost an inch during a ten years' campaign, and that the corrosion had gone up as high only as it had been possible to raise the tuyeres. Fortunately, the supporting arches had put a stop to this, otherwise the furnace would probably have been gobbed up to its very mouth. In the meantime, the necessary fire-bricks and materials had been procured from Messrs. Otto & Co., of Dahlhausen on the Ruhr, which firm made such a splendid show of refractory bricks and coke ovens at the Düsseldorf Exhibition, and from M. de Latte, of Ardenne, Belgium. On the fourth day the reconstruction of the furnace began, so that the wall between two tuyeres was broken away to its whole injured height; the obstructing masses, from the bottom stone upward to the boshes, proved to be all of the same nature, consisting chiefly of a very basic slag, which, in contact with the air, crumbled to a white dust, mixed with some half-burnt coke, but with very little unreduced iron ore or iron. In fact, they were formed by injudiciously adding about 30 per cent. too much of lime, as would have been required for a fusible basic cinder; and when the first accumulations had to show in the hearth, instead of changing it, this mixture was recklessly continued with, so that that the gobbing grew higher and higher, while the tuyeres had to be raised continually when any blast was to go into the furnace at all. After this reconstruction the lower part of the furnace showed in the walls six openings from the tuyere beds up to the boshes, and one at the front side, through which it was then not difficult to break out the rest of the lime obstruction, K, which had been left standing as a support to the glowing furnace charge above. After being taken out, it was found, however, that a cinder arch, g, had been formed by the cooling influence of the air, and that it kept the materials back, so that it was possible to fill the whole empty space below with about 20 tons of good dry coke, which was mixed with about 1½ tons of siliceous glassy blast furnace cinder, upon a bed of logwood. After this operation the furnace was closed above the tuyeres up to the boshes, and it was then, after 14 days' work, as ready for a start as a new furnace which is to be blown in. The furnace top was then opened, the stack filled up to the brim with charges having a slight excess of coke, and, after the gas valves were reopened, fire was set to the coke in the hearth, so that after 12 hours it was all on fire; and when now the blast was turned on from the newly replaced tuyeres, the fluid cinder soon filled the hearth to its usual height, and, after 15 hours' blowing, the first tap of iron could be made. The cinder arch had gradually given way and permitted the charges to descend in toshes and crucible. These charges have been four weeks in the furnace; the third tap, however, gave already gray foundry pig, and from that date the furnace has behaved as regularly as ever before.

The gobbing of lime weighs about 30 tons, and it seems almost miraculous that such a quantity could have been taken out of a furnace which had still life in it. This operation is certainly, perhaps, the strangest "Cesarean operation" ever performed upon an iron-blast furnace. Mr. Büttgenbach, the successful operator, is of opinion that an important lesson may be learned from this remarkable case, namely, that under special circumstances it may prove desirable to fill the crucible and boshes of a furnace with an infusible mass of lime on purpose, whenever its lower parts require a renewal, while the stack is still in a good condition, and it is desirable to avoid the loss of time and considerable expense which the blowing down and relighting of a blast furnace require. It is true that the gradual filling of a blast furnace with limestone has been done many a time before when it

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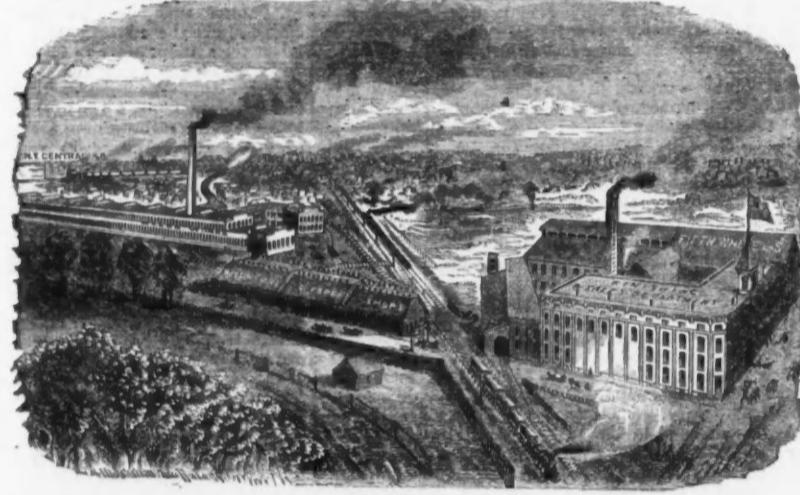


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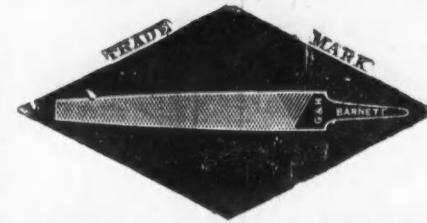
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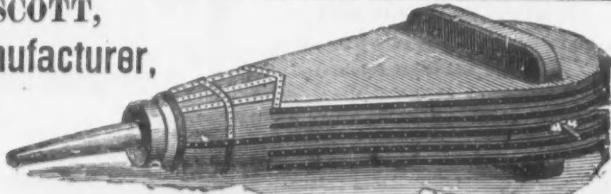
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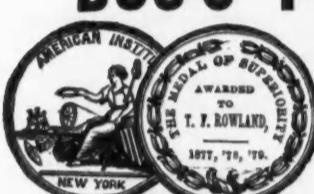
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Any variations from the regular size or shape of the above-named goods made from sample to order.

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This Bucket is struck out from the best charcoal iron; consequently is very durable. It requires 50 per cent. less power to run it than the old-fashioned square bucket, and will outwear half a dozen of them. Over 300,000 are now in use by the principal Millers, Brewers, Maltsters and Manufacturers at home and abroad. It is the best Bucket manuf.

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Every machine unconditionally warranted. It has an adjustable vibrating handle, perfectly adapted for Terraces, Slopes and every variety of Lawn.

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London Underground Railways.

The London Underground Railway differs from all other English railways in this—that it has neither beginning nor end. Other lines are alternations of cuttings and runs in the open, more or less elevated above the natural level of the surface, occasionally varied by a tunnel; this is a continuous burrow, succession of covered ways, with troughs of various lengths at irregular intervals, open to the sky for light, but more especially for ventilation. On other railways you measure space by miles; here you count it by chains and furlongs. Other lines run a dozen, perhaps 20 or 30 trains daily; the number of trains passing over the Underground every day is little short of 2000. The most thriving of other lines do not count up more than £100 sterling a mile in their receipts; the Underground yields over £1200 sterling a mile. Last year (1880) 150,000,000 of people passed over this line, and on Whitunday, 1880—the day when the greatest number went over it—the number of passengers traveling to and from different stations was 689,497. These facts at once prove the inestimable value and importance to Londoners of the Underground Railway, and show what a blessing it is to the vast population which must get quickly to its work, and to which the breath of country air, now within reach of the poorest, is life and health.

The first portion of the Metropolitan Underground Railroad, extending from Bishop's road to Farringdon street, was opened for public traffic on the 10th of January, 1863. It was then in the nature of an experiment. So prompt and grand was its success, that the work was continued, until now its ramifications extend in a thickly-webbed network, from almost every central and suburban point where people live, to every central and frequented point where people work.

Extensions were rapidly made westward toward Hammersmith and eastward into the city, having termini at Moorgate and Broad streets, while a branch line, joining the first at Baker street, extended northward to the secluded quarter of St. John's Wood. While one circle will carry you from Moorgate street via Euston road, Tottenham Court road and Edgware road, to Notting Hill and Kensington, an outer circle conveys you, by King's Cross, to the northern chain of suburbs, notably to Kentish and Camden towns. As the enterprise has become more and more extended, new improvements have been added, the tendency in England, as well as in America, being to increase the conveniences and luxuries of the traveler. More recently, open have been preferred to covered ways or tunnels, and every opportunity has been taken to increase the number of the former, so that the later ramifications are only to a certain extent underground. When the property which had to be purchased has been moderate in price, the line of the road has simply been made a valley instead of a burrow. But when, as occurred in one instance, the company have had to purchase rows of costly mansions, half built, this plan is too expensive. In many cases the tunnels have been run underneath large buildings, which have been underpinned, the business in which was not for a moment interrupted. For three miles of railway more than 50,000 cubic yards of earth was removed, and of the clay which partly composed it 22,000,000 bricks were made. The new stations are admirable structures in the adaptation to their purpose. The double station at Kensington High street is, perhaps, the largest and best of them, and may be briefly described:

The center consists of a spacious and lofty apartment, 44 by 35 feet, which is used as a refreshment room. The two ticket offices—for this station is double, as being at a junction between two lines belonging to different companies—are across the ends of the building. These, as well as the station walls and roofs, are very light, graceful and effective structures. They are faced with white perforated bricks; the doors and windows have semi-circular heads, and each window sash is filled with a single sheet of plate glass. The entrances to the ticket offices are under iron verandas roofed with glass. These offices are, of course, on a level with the street, and the station is surrounded with an ornate cupola. Galleries cross the rails overhead for exit, entrance or change of platform. Stairways descend underground from the offices to the platforms on either side, this subterranean apartment being lighted partly by skylights above and partly by globular lamps suspended over the platforms on either side. The station is abundantly supplied with closets, neatly fitted up for the convenience of passengers. The platforms are plank floors, and are sufficiently long to secure six English cars 42 feet long each, with engine and tender. Opposite the platforms, on the walls, are large signs with the name of the station, besides numerous advertisements of every imaginable commodity, in letters of every size, shape and color, some of them being really handsome pieces of ornamentation. The arrangements are so perfect that there is room enough for all, and although the train stops seemingly an instant in each station, it does not start until every passenger is, as the case may be, in or out.

As in most other English railways, the cars of the Underground are divided into first, second and third class, with accommodations and comforts corresponding and fares graduating accordingly. It is not, therefore, surprising to learn that the number of third-class passengers has always been greatly in excess of those of the two other classes combined. The best patrons of the Underground are the artisans, the people who live by the toil of their hands and the sweat of their brow; and it is to this great class that the Underground has itself been a boon of value to them incalculable. They are carried to and from their business in well-built, airy cars, which, if not cushioned and carpeted like the first-class cars, have, at least, clean wooden seats, wide windows and plenty of room. The average third-class fare for any distance is twopence (4 cents) each, being two-thirds less than the omnibus and tram-car fares, the speed of transit being thrice as rapid; but there are, besides, morning and evening hours, during which penny (2 cents) trains are run for the benefit of the workingmen. Every such train is known as the workmen's train. The workmen may travel by trains running at intervals of five or ten minutes from 5 in the morning till 12:30 at night. Their fare is saved in shoelather alone; for the laborer who now for his penny goes from his suburban cottage to his factory in the heart of the city, six or eight miles, by steam, was wont formerly to trudge it wearily, to the wear and tear of his constitution, as well as of his boots.

It may be interesting to know how this great line is managed, and what measures have to be taken to insure the public safety and comfort. Probably there is no man in London—not excepting even the Lord Mayor himself—with heavier responsibilities resting upon his shoulders than the manager of the Underground Railway. An outsider might think that the working of the line is easy enough—that it is only setting trains in motion and keeping them running to time. The general manager is commander-in-chief of the line, and pays for the power and dignity by bearing the responsibility for everything which goes wrong, and by receiving but scant acknowledgment for the great deal that goes right, and for the inevitable anxiety and eternal vigilance which are indispensables in the performance of his office.

If, at 4:30 a. m., we are "early birds" enough to be up and find ourselves at the big shed of the Edgware Road Station, we shall not have to wait long before seeing the engines turned out, which initiatory operation takes place 20 minutes before 5. The night before they have been thoroughly examined, oiled, cleaned and prepared for the ensuing day's work. They start off in rapid succession to the different termini of the line, where the empty trains are sheltered during the night. At 10 minutes after 5 the trains begin running according to the time tables. The engines arrive at the stations in succession, leaving again with the trains attached 10 minutes afterward. For example—an engine arriving as 5 a. m. leaves with a workmen's train at 5:10, and so on. At first there is plenty of room in the trains, the travelers in the very early morning being scant groups of sleepy folks huddled napping in this corner and that. As the morning advances the traffic increases, and now the trains are run in quick succession, the average intervals between them throughout the day being three minutes. At 7:27 p. m. the withdrawal of the locomotives begins, and continues till 1:15 a. m., when the last locomotive puffs into the Edgware Road shed, which is the resting-place of all the engines for the night. The last train is the Hammersmith train, which steams into Moorgate street at 12:40; the average number of passengers for the 20 hours having been upward of 250,000 on the Metropolitan alone. Besides this traffic of the Metropolitan proper, the Great Western, Midland, Great Northern and London, Chatham and Dover companies send more than 400 trains over the same rails every day. Of late the Metropolitan, or principal underground company, has become a sort of key by which the traffic of nearly all the railways branching out of London is interchanged. You may procure tickets from its stations to almost every point in the three kingdoms, and make connections accordingly from almost every part of the metropolis to your destination in the country.

Extensions of the two lines, known generally as the Underground Railway, are constantly in progress of construction. At one end the railway has been extended from Moorgate street, in the city, to Liverpool street, in the far east end of London, thus forming connection with the whole great eastern system of railways. Then a section was completed, some time ago, between Westminster and Cannon street, along the Thames, which has proved a boon to the thousands who used to crowd the little penny steamboats on their way to the city from the regions of Chelsea, Pimlico and Brompton. One of the greatest blessings of the underground railway to the cockney world has been to thin out, in some degree, such choked up, dangerously crowded thoroughfares as Piccadilly, the Strand, Fleet street and Cheapside. Since the opening of the Thames Side Railway, between Westminster and Cannon streets, the number of cabs and omnibuses which used to suffocate those great arteries of traffic has largely decreased; and, already, it is estimated, this "inner circle" of the Underground has thinned out 150,000 from the vast throng which crowds the central thoroughfare of the metropolis.

Statistics prove, too, that traveling by the Underground is less perilous to human life than riding or even walking in the streets. During last year nearly 400 persons were knocked down and killed, by vans and other vehicles, in London streets, besides the many hundreds that were injured, but more or less narrowly escaped death. But of the 150,000 who traveled by the Underground, only a very few lives were lost, and not a solitary one by any neglect or fault of the company's management.

The entire length, or more correctly, circle, of the Underground Railway, and all the branches, are fitted with the block system, and the machine by which the trains are worked is so ingeniously designed that it is almost beyond the range of possibility that a train should be run into the wrong station, or that there should be a collision. Nothing short of extreme negligence or criminal design could effect either of these calamities, for the instrument acts absolutely as a check upon any negligence on the part of the signalman. The management exercises the greatest care in the selection of subordinates, and the rules by which the latter are controlled are despotically strict. No one is taken into the service without a character, that is, a certificate of good behavior and habits from his previous employer; and, having entered the service, the employee is placed under very strict discipline—immediate dismissal being the peremptory penalty for carelessness. On the other hand the employees are encouraged to do well by a system of reward, for a yearly bonus is given to those who faithfully and zealously perform their task.

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OF EVERY DESCRIPTION.**

My blades are forged by hand from the best cast steel and warranted.

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OUR NEW PATENT
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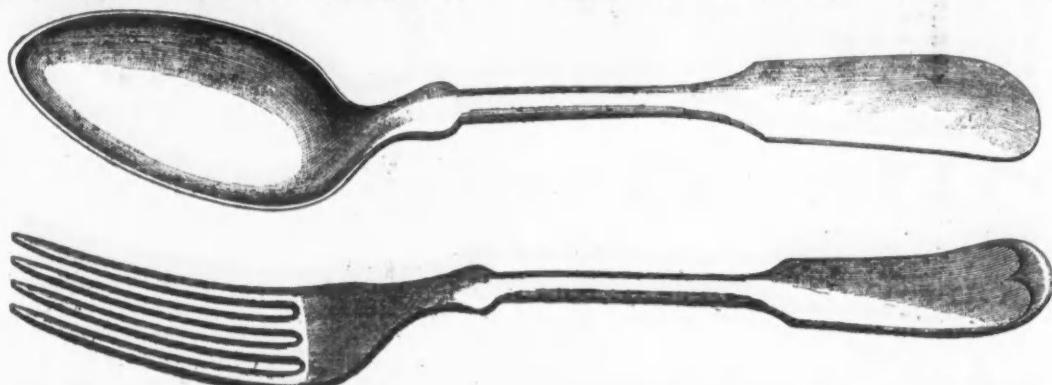
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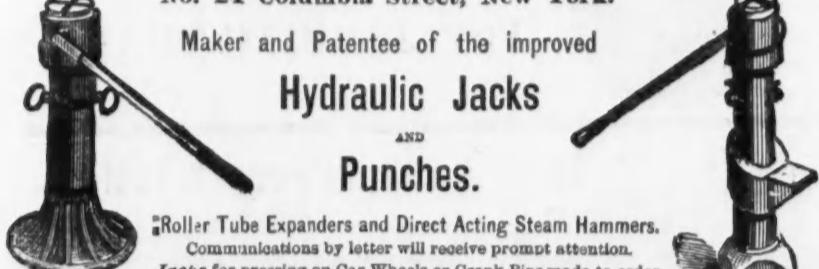
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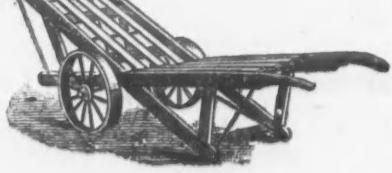
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With its countless omnibuses and cabs, tram cars and little Thames steamboats, and its Underground Railway now ramifying in every part of the metropolis where traffic is to be relieved and the streets made passable, it would seem that London is well supplied with conveniences for locomotion. But this age, whether in England or this country, is never content with its new facilities. The later tendency in England is to give the government as large control as possible over institutions which are for the general benefit, and it may be that before long there will not only be a government horse railway, at least on the Surrey side of the Thames, but that the Underground will itself be brought in and governed by the ministers of the crown. However, there is no predicting what innovations John Bull will assent to until his assent is fully given.

Business and Trade in Russia.

From the fact that Gen. Ignatief, the Russian Minister President, having a large estate in the coal-mining district of the Donets Valley, a fresh spurt is anticipated in the Russian coal trade. This may rest upon no foundation, but it has had the effect of stimulating the flagging spirits of Russian speculators in coal mines, and has reacted in a measure upon capitalists at Berlin and Paris. At the latter place a telegram to the *Novosti* a day or two ago states that a company has been formed there under the auspices of M. Novoselsky, to work the iron and coal mines on the estate of M. Antseroff, in the province of Orel. As the capital is fixed at 50,000,000 francs, or over \$10,000,000, the enterprise promises to be a big affair.

On a smaller scale a company that is being formed at St. Petersburg, with a capital of 500,000 roubles, or \$300,000, to work two groups of coal and iron mines: one at Ivanovsky, in the province of Ekaterinoslav, and the other in Khrustalevsky, in the country of the Don Cossacks. The present proprietor of the latter is Mr. Brodsky, the millionaire Jew at Kieff, whose costly mansion there was recently wrecked during the anti-Jewish disturbances. Another enterprise on foot is the conversion of Putiloff's iron works, St. Petersburg, into a French joint-stock concern. The works are the largest in Russia, and have employed as many as 8000 men at a time. Putiloff, who died a millionaire a year ago, may be said to have established iron rail making in Russia. Since his death the works have not been well conducted, but it is thought they will revive under fresh management. The moment is not a very auspicious one for introducing foreign capital into Russia, but the French have a mania just now for Russian enterprises, and hence every week some fresh scheme or other starts into existence at Paris for taking over a decrepit Russian concern and working it up into a profitable undertaking. In most cases the French shareholders will probably lose their money.

As a matter of fact, the iron trade in Russia is in a very bad way, and the coal trade is not much better. Take the leading engineering firms at St. Petersburg, for instance, where things are brighter than in the interior, and the state of trade may be tolerably well gauged:

	Usual number of workmen.	Present number.
Baird's Iron Works	4,000	9,000
Samoimovsky Iron Works	1,400	500
Nobel's Iron Works	1,400	6,000
Alexandrovsky Iron Works	800	1,500

At seven other establishments there has been a similar reduction of hands, and at the Cronstadt dockyard two thirds of the dockyard employees have received their discharge. The general cry is that there is no business stirring anywhere, and that, owing to the political condition of the country, enterprise is at a standstill. That this outcry rests upon a tolerably good basis, is shown by some returns just issued of the new enterprises floated in Russia in 1880. Throughout the year only seven new companies were started, the aggregate of their capital being \$16,000,000. More companies than this, with a considerably larger capital, are started in London every week of the year. The comparison is all the more significant if we remember that these seven new joint stock companies referred to the whole of Russia—the entire empire. At the present moment the aggregate number of public companies in Russia is only 544, which comprises 48 banks, 27 insurance companies, 47 railway companies, 50 steamboat companies and 372 industrial enterprises of various kinds. Such statistics enable one to realize the industrial backwardness of Russia better than whole columns of assertions. There being, really speaking, no enterprise whatever (in comparison with other countries) in Russia just now, the iron trade suffers in common with other countries, and has in front of it prospects of the most gloomy description.

One thing is largely responsible for this state of affairs—Russia is building no railways. She has in hand, it is true, the little line across the Transcaspian desert to Kezil Arvat, and a small link joining Baku on the Caspian, with the Caucasian town of Tiflis, but in Russia itself nothing is being constructed except an insignificant branch line here and there. Last year the aggregate of the additions to the Russian railway system did not exceed 700 miles—in the United States the total during the same period was 7207 miles. This is a difference with a vengeance. When it is considered that Russia and America are competing fiercely for the corn market of Europe, the odds against the Russian peasant through the non-construction of new railways are becoming enormous. Every day sees him less able to compete with the American, and in a few years we may probably see Russian corn driven out of every European market, in which case Russia will stand a good chance of becoming bankrupt. The total mileage of railways in Russia is only 15,000 miles, as compared with 93,704 in the United States. If Russia does not make proportionate progress, in a few years time she will have a less mileage of railways than either India, Australia, Canada, or the Cape. The great drawback to the development of railways in Russia is the fact that the existing ones hang like a millstone round her neck. When the late Czar came to the throne there was only one railway in Russia, running from

St. Petersburg to Moscow, a matter of 450 miles. Alexander II started vigorously to repair the remissness of Nicholas, but he proceeded on a wrong basis. All his lines were constructed for military purposes, that Russia might invade Turkey, Austria or Germany with as much facility as possible. No attention was paid to commercial interests, and, for the sake of shortening the distances, not the slightest curve was made to take in the towns en route. The consequence is that there is hardly a line in Russia which does not have a heavy deficit at the end of the year, which, with the guaranteed interest, has to be made good by the state. Instead of developing Russia, the railways constructed have actually retarded her progress. Through their annual deficit, they occasion such a drain upon the national exchequer that the government has no funds left to construct fresh lines to open up the districts most in need of railways. In this manner Russia is paying heavily for the aggressive policy of the late emperor.

Horizontal Tubular Boilers.

In the *Locomotive*, published by the Hartford Steam Boiler Inspection and Insurance Company, we find the following:

In the early history of the horizontal tubular boiler, it was regarded necessary to crowd as many tubes as possible into the lower half, especial care being taken to put them in after the plan known as "staggered," because more tubes could be inserted and all the room economically (()) occupied. Little regard was paid to the spaces between the tubes and shell, or to the distance of the tubes to each other. The question of the circulation seemed to have been little thought of, and almost no regard was paid to facilities for inspecting and cleaning. The tubes used were usually 2 inches and 2½ inches in diameter. They were packed so closely together that after a year or two the spaces became filled with deposits of lime and mud, and their efficiency was greatly impaired. In time, 3-inch tubes were introduced, but the manner of setting them was not changed. When the Hartford Steam Boiler Insurance Company first began business this was the condition of things mainly, and we at once set ourselves at work to influence, if possible, a change in this practice. Our aim was to have the tubes not less than 3 inches in diameter, and to have them arranged in vertical and horizontal rows, and not in any case nearer than 3 inches to the shell of the boiler. This, of course, reduced the number of tubes, and consequently the calculated heating surface of the boiler, and was bitterly opposed by many boiler makers. The rapid increase in manufacturing and consequent increase in the use of steam demanded important changes in the methods of constructing boilers, but the old prejudices lingered, and gave way only under severe pressure. A manufacturer wanted a new boiler of a certain horse-power. He would apply to two or more boiler makers for estimates of cost. They would make up their specifications accompanied with the estimated cost. On examination it would be found that their specifications agreed only in length and diameter. One would be crowded with tubes, while the other would have them well arranged and judiciously distributed. The former would claim greater efficiency because his boiler had more tubes, and, consequently, more heating surface, while the latter would contend that his boiler was superior because it provided for free circulation of the water. There was great difference of opinion among boiler makers on this point, and there seemed to be no well-established authority on the subject. Again and again were we applied to as umpire in such cases, and without reference to workmanship, which would be equally good in both cases, we believe, we invariably advised the tubes to be set in vertical and horizontal rows, well distributed, and in no case nearer than 3 inches to the shell. At the bottom we advised at least a distance of 6 inches in the smaller boilers, and 8 inches in the larger ones, for abundant room to adjust the hand holes—one in each end of the boiler—and to give a larger body of water over the fire, which is the hottest part. This was a great improvement on the old practice and came to be very generally adopted, and is largely the practice to-day, particularly in the East.

But experience raised the question some time ago as to whether this plan could not be improved upon! Were the tubes equally efficacious? It was found that the levity of the heated gases naturally carried them to the upper rows of tubes and the lower ones consequently did comparatively little work. The question then arose how many tubes can be removed and the maximum efficiency of the boiler maintained! Another was, as to whether the size of the tubes should be increased. We have experimented more or less in this field, and, to say the least, favor a reasonable departure in this direction. We have furnished many specifications for boilers constructed on this plan, and they have given good results. Boiler makers in many parts of the country are constructing boilers on this plan.

Over the center of the bottom there should be a distance of 15 inches from tubes to shell. This gives space for a good solid body of water over the fire, besides allowing room for a manhole in the front head underneath the tubes. The latter arrangement greatly facilitates the work of inspection. The entire bottom of the boiler can be inspected internally and externally, and sediment can be easily removed.

Some very wild statements have been made of late in regard to the Channel Tunnel scheme, based chiefly on the talk of Sir Edward Watkin before a recent meeting of the shareholders of the Southeastern Railway. It seems that that gentleman is convinced that the tunnel can be put through in five years, and that no trouble will be encountered from water. He bases this exceedingly sanguine view of the matter upon the fact that in driving an experimental gallery through the chalk with the Brunton machine, an advance of 67 yards had been obtained in a 7-foot heading, and that during the excavation no serious quantity of water had been met. This result may be very flattering, but it does not by any means justify the conclusion that because 67 yards had

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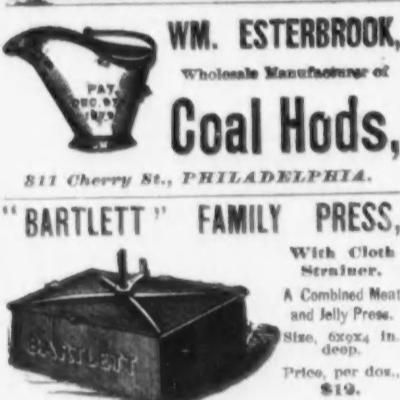
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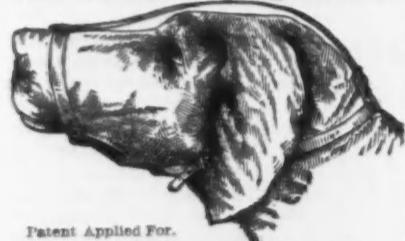
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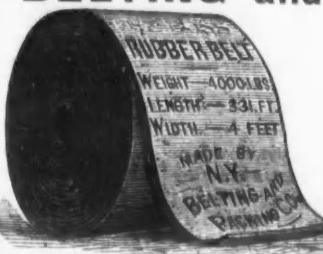
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Pat. 11,208, 213,602. Pat. July, 1870.

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been made in a short gallery, two miles could be made in one year, and ten, one-half the distance across the Channel, in four years. Nor does the absence of water prove that there is no fissure in the chalk under the Channel through which an inconveniently large volume of sea water might flow. The difficulty of transportation of materials and debris, of ventilation, &c., increase at an enormous rate with an elongation of a tunnel, as experience in the Mont Cenis, St. Gotthard, Hoosac and other enterprises has fully proven. It will take much more time and very much more money than any estimate of expenditure based upon a small experimental driving of a 7-foot heading would yield. With unlimited funds and ample room the Channel tunnel might be built, but it is extremely doubtful whether it would ever pay.

HILL'S SPRING WHIFFETREE.

We show in the accompanying illustration an improvement in whiffetrees, which will command itself to all who have had experience in heavy trucking. It is made by the American Car Starter Company, at Wilkensburg, Pa. The spring is made of the best steel, and will carry from 5000 to 12,000 pounds. The main section of the spring is in two parts, this construction having been adopted to avoid the tendency to breakage. It has been for the past six months practically tested in this city in heavy trucking service, and has given excellent satisfaction, easing the horses and enabling them to move heavier loads with less fatigue than would be possible if the draft came on a solid bolt. With this whiffetree there are no jerks or

States. Mr. Alexandre's remedy against the collector, if the former has suffered any wrong at the hands of the latter, is by civil and not criminal proceedings.

American Iron Steamships.

The American iron steamship yards are all prospering, being well occupied, and they are turning out good work. This is true of shipyards at Wyandotte and other points on the Western lakes and rivers, as well as on the Atlantic coast. Some of the iron steamers recently put afloat for lake navigation would compare well in size and equipment with first-class ocean steamers. One of the new features at Detroit is the construction of immense iron pontoon hydraulic lift docks, capable of taking up vessels 400 feet in length and 60 feet wide. Large works are also under way in the iron shipyards at Cleveland, where orders are waiting execution. Among specimens of lately finished work on the seaboard, we may point with pride to the boats built by Messrs. Roach and Cramp for the Iron Steamboat Company, and which now daily grace the waters of New York Bay, carrying thousands of excursionists. In general appearance they are scarcely distinguishable from the wooden steamers formerly built, excepting in their evident lightness and celerity of movement.

It is pleasing to know that two more superb iron steamers are to be added to the four already running in Ward's Havana line, Mr. Roach being already engaged in laying the keels. These two will closely resemble the Newport in size, appearance and speed. As Ward & Co. now carry the



lurches, and, when the horses are started, the vehicle responds before the spring has been compressed to the limit of its play. Mr. B. F. Turner, Williamsport, and 938 Seventh Avenue, New York, is general agent for the United States.

The Lay-Haight Torpedo Boat.

English and other naval officials have ridiculed the idea that a torpedo boat can be propelled at a high rate of speed by carbonic acid gas unless some chemical means be employed for heating the gas. That it can be done was demonstrated recently by the Lay-Haight boat. The Whitehead boat is started from the shore by being shot from a tube, and can only be used for short distances, say from 100 to 500 yards, making, however, from 18 to 22 miles an hour. The English experts told Mr. H. D. Windsor, of New York, who, with Mr. George E. Haight, of Hartford, owns the Lay-Haight improvements, that the controllable torpedo is too slow; that vessels of ordinary speed could readily keep out of the way, or small boats might be able to head it off. But these objections have been met by the Lay-Haight torpedo, which during recent trials at Newport has attained a speed of from 10 to 12 miles an hour. This has been obtained by a new method of expanding the gas in the pipes exposed to the sea water. The liquid is taken from the flask into a series of pipes running parallel with the torpedo boat, and which are exposed to the sea water. The electrical apparatus is quite simple and consists of the key-board on shore, with a peculiar arrangement of buttons which enables the operator to stop, start, port, starboard and fire by the mere touch of one of the buttons. These different functions are performed through a single wire. By means of a weak current the operator brings his key-board in unison with the transmitter on board the torpedo. With the aid of an increased current the throttle is opened or closed as desired, and by a still stronger current, the extent of which is at all times controllable by the operator, the torpedo is fired either by contact or at will. The explosion is made more complete by the absence of all complications, such as large magnets, shunts and other electrical devices.

The machinery of the new boat consists only of the engine and a straight, hollow screw shaft, which is attached to one of Herreshoff's wheels. The boat may be launched upside down or dropped from a distance without disturbing any of the mechanism. The boat is in three sections, the forward part containing the explosive, the middle section the reservoir or flask, and the after section the cable, engine and electrical apparatus, all of which can be put together in half an hour's time. The cable may be increased in length from half a mile to a mile and a half, as desired, the operation of the torpedo being equally effective at both distances. In operating the Lay boat from three to five wires have heretofore been used. The Lay-Haight is operated by only one, as stated, by the increasing of the current at will and by a simple contrivance for bringing the function, such as stopping, starting, &c., in direct unison with the key-board. The boat is to be known as the Lay-Haight torpedo. She is 23 feet in length, 10 inches in diameter, and the length of the cable is one mile. She carries explosives weighing 150 pounds, and is entirely controlled by electricity. The motor—carbonic acid gas—is contained in a flask which forms part of the hull. One great improvement over the Lay boat is the reduction in the size, this boat being about one-half the weight, or 1000 pounds. For use on shipboard and small launches a smaller boat has been constructed, weighing only 600 pounds, but it carries the same weight of explosives.

The first annual report of the relief association organized by the Baltimore and Ohio Railroad Company for the benefit of its employees, has been made by the manager, Dr. W. T. Barnard. The association was inaugurated a year ago, and embraces the features of life and accident insurance, weekly allowances and annuities. The railroad company donated \$100,000 and agreed to bear all expenses of the management, so that all receipts are returned to members in the form of benefits. The company also allow half rates to members and their families traveling over the road. The association now has a membership of 14,439. During the year 4107 claims were paid and 502 doctors' bills, aggregating a total payment of \$5599.33 on account of deaths, accidents and sickness for the year. The report contains an analysis of causes of accidents—a matter of special interest to all railroad men, as this is the first movement of the kind. The railroad company maintains that their outlay for the organization and maintenance of the association is more than compensated by the avoidance of lawsuits with employees who suffer in the railroad service, and that employees render better service, being assured of being well cared for in case of injury, or having their families provided for in case of death.

The Mexican budget for the present financial year amounts to \$25,320,165. With railroad obligations already amounting to \$4,000,000 per annum, and regular deficits for the past 20 years, how long before Mexico will default on her promised subsidies to railroad corporations, which with so much freedom?

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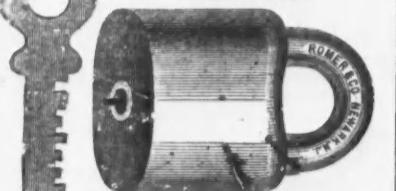
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and yet creates but little friction.

This Packing is made in lengths of about 20 feet, and of all sizes from $\frac{1}{4}$ to 2 inches square.

Pat. 11,208, 213,601

For Halls, Flooring, Stone and
Iron Stairways, &c.

Pat. Jan. 26, 1869.

Pat. July, 1870.

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Pat. 11,208, 213,601

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AND

Metallurgical Review.

New York, Thursday, July 14, 1881.

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The publishers of *The Iron Age*, 43 Cannon street, London, England, will be pleased to receive subscriptions and advertisements on our regular terms.**CONTENTS.**

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Thirty-sixth Page.—Boston Hardware and Metal Prices.

The lock of the Davis Island dam, which the United States government is building across the Ohio below Pittsburgh, is approaching completion. The lock walls are finished, and the channel through them has been dredged 70 feet below the level of the river bed at that point. The locks will be opened and the river allowed to run through them, which will afford an ample depth of water for all craft and relieve the river at low water, so that work can be prosecuted on the dam without hindrance, except when the water is high. Pile driving for the foundation of the dam will begin in a few days, and the first section (500 feet) will soon be under way. The lock of this dam is the largest in the world, being designed to receive the enormous coal tugs that are so common on the upper Ohio. The dam itself will have movable wickets, that can be raised or lowered in low or high water.

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Condition of the Blast Furnaces of the United States, July 1, 1881.

We are again enabled to present our readers with our usual quarterly statement of the condition of the furnaces of the country. In view of the reports that have been current as to blowing out of furnaces, this is of more than usual interest, and will indicate not only to what extent furnaces have been blown out in the last three months, but also how they compare with other years. In order to avoid any misunderstanding and to point out exactly the scope of the table, the following explanations are given:

1. The divisions of the localities are geographical for the most part, and are not made with reference to the points from which furnace supplies are drawn. 2. The columns "in blast" and "out of blast" only show the stacks from which we have reports, and their footings will not in every case equal the footings of the column of total number. 3. We have included some furnaces that are rebuilding and not yet completed, and others that are building, and in one or two cases some furnaces that have been reported abandoned, since their owners do not report them. In other cases we have stricken from our list furnaces that are generally included in such lists, as we are assured that they are permanently out. 4. The column of capacity per week is somewhat in excess of what the regular working of the furnace will show—stoppages, slow working and various other causes, which will readily occur to those interested, combining to reduce the make below the furnace capacity. On the other hand, the capacity of many of the furnaces has been constantly increasing for the past few years, which makes the totals of capacity vary from quarter to quarter.

In a condensed form the table shows the following (I in blast; II out of blast):

	I	II
CHARCOAL	147	125
ANTHRACITE	140	90
BUTUMINOUS	144	77
TOTAL	437	292

The condition of the furnaces at the 1st of each quarter of the present year is as follows:

	IN BLAST.	JULY 1.	APRIL 1.	JULY 1.
CHARCOAL	160	139	147	125
ANTHRACITE	162	159	146	90
BUTUMINOUS	151	155	144	77
TOTAL	473	453	437	292

OUT OF BLAST.

	JULY 1.	APRIL 1.	JULY 1.
CHARCOAL	112	132	125
ANTHRACITE	76	80	90
BUTUMINOUS	63	64	77
TOTAL	215	276	292

It will be noticed that there has been but little change in the past six months in the condition of the furnaces—less than 10 per cent. The greatest change has been in charcoal and anthracite furnaces, and the east in butuminous, there being seven less on July 1 than on January 1, and eleven less than on April 1.

Another noticeable feature of this report is the greater average capacity of butuminous furnaces shown; 146 anthracite furnaces have a capacity of 33,313 tons a week; 144 butuminous, 48,796 tons, or more than one-third greater.

For the last five years the relative condition of the furnaces on July 1 was as follows:

FURNACES IN BLAST JULY 1.

	1877.	1878.	1879.	1880.	1881.
CHARCOAL	87	64	81	131	147
ANTHRACITE	87	95	101	157	146
BUTUMINOUS	83	89	95	115	144
TOTAL	259	248	277	413	437

FURNACES OUT OF BLAST JULY 1.

	1877.	1878.	1879.	1880.	1881.
CHARCOAL	187	181	170	136	125
ANTHRACITE	139	130	125	64	90
BUTUMINOUS	123	120	107	109	77
TOTAL	443	460	408	313	292

This table shows that the anthracite furnace industry is in a worse condition than a year ago, 21 furnaces more being out of blast now than then, while of the butuminous furnaces 29 more are in. The causes of this condition would furnish an interesting article.

Some years ago a considerable number of influential millers formed a national association for the purpose of protecting and advancing common interests. Among other matters they undertook to defend themselves against the attacks of those who claimed to possess patents for improvements in general use, and accordingly fought with much success the owners of what is known as the Cochrane re-issue, expending considerable amounts for legal services. All efforts to induce outside parties to aid in carrying this self-imposed burden failed, even though threats were apparently made to accept a compromise, and thus afford the holders of the patent an opportunity to bring outsiders to terms singly. At the recent meeting of the association a compromise was finally made for little more than a nominal sum, though the courts had decided against the patent. Professally the members preferred rather to pay than to run the risk, however small, of being defeated on appeal with its attendant expense, but there seems

little doubt that their action was, at least to some extent, prompted by a desire to take revenge on those who were content to see others fight their battles and watch the issue of the struggle. There are few who will sympathize with the latter party, but it must be a source of regret to all to see that such a motive should have aided in determining business men to abandon an apparently good cause. Such a proceeding gives encouragement to a class of men who base a regular system of frightening manufacturers into the payment of royalties upon the liberality of our Patent Office in granting its privileges, and the tendency of the courts to sustain the so called "inventors" in all but the most undisputed cases.

The Future of Copper.

For many years the copper trade in this country has been in a peculiar condition. The mines of Lake Superior, except in years of unusual activity, have produced a surplus of the metal which they have invariably sold abroad at a price lower than it was held for in this market, and in consequence of its excellent quality it always found ready purchasers there. We have no intention of entering upon the question whether this was a sound policy or not. Its effect was to keep the market here at a figure corresponding to the cost of importing foreign copper with the duty added. With raw material of unexampled tenacity, and by the use of excellent machinery, our manufacturers succeeded in producing articles, notably cartridges, which found a market all the world over. But they could only secure these important contracts by making arrangements with the Lake companies for a heavy reduction in the price of the raw material. Of late years, however, foreign governments have commenced to purchase American machinery, Lake copper and Lehigh spelter, and the demand for our manufactured products has been falling off. But within the last two months developments have been made that give quite a different aspect to the copper trade and the industries dependent upon it, and a brief review of the present condition of affairs and an examination of their prospective development deserve, the earnest consideration of those interested.

Unfortunately the statistical data concerning the production of copper in the world are not complete, but a study of the output of the principal producing countries alone will prove amply that the copper mines are producing more metal than consumers are willing to take. The markets have been suffering from overproduction, in the sense that increased supplies have been coming forward steadily without a corresponding reduction in the price, the result being an uninterrupted increase in the stocks. From the latest statistics available we compile the following table as the production of the various countries of the world:

CONDITION OF FURNACES JULY 1, 1881.

	Jan. 1.	April 1.	July 1.
CHARCOAL	160	139	147
ANTHRACITE	162	159	146
BUTUMINOUS	151	155	144
TOTAL	473	453	437

	JULY 1.	APRIL 1.	JULY 1.
CHARCOAL	112	132	125
ANTHRACITE	76	80	90
BUTUMINOUS	63	64	77
TOTAL	215	276	292

The stocks in England and France have now reached the enormous total of 47,000 tons, and although a large portion of it has been held for many years in very strong hands, the indications that the load is getting too heavy for the holders to stagger under are becoming more numerous.

Such is the condition of the copper markets of the world, which the American producers are about to enter, not as sellers of a surplus of metal at any price for the purpose of being able to maintain prices at home, but in order to reap a profit over cost of production. The exports of Lake copper from this country during the last ten years have been as follows:

YEAR.	EXPORT.	REIMPORT.
1874.	8,006,809	—
1875.	6,842,350	—
1876.	15,921,460	—
1877.	11,418,644	—
1878.	12,997,597	—
1879.	13,733,215	2,442,476
1880.	12,901,713	—
1881, to July 1.	5,789,350	268,500
TOTAL.	74,677,935	4,872,292

Roughly, therefore, we have exported 37,000 tons of Lake copper during a period of 7½ years.

It will be understood from the foregoing that we have generally had a surplus, but that this excess of production over consumption was controlled virtually by one party. This is now

about 14 times the space of the water itself. We quote Mr. Colburn's figures from memory. He says, in effect, that there may be many cases when this action may determine an explosion.

To invent such terms as "superheated water" and to talk of a "vacuum" in the steam space of a boiler is foolish, to say the least. And we think we may be pardoned if we do not see any great merit in the work done by the gentleman. The explosion about which so much has been said is a very insignificant affair, at least from Mr. Lawson's own standpoint, when compared with the second one which took place at Sandy Hook. Here the boiler had been tested the day before to 60 pounds, yet it exploded at 53½ pounds per square inch and went all to pieces. One mass of about 3 tons weight was thrown 450 feet, and in passing that distance went a long way up into the air. The committee says of it: "Almost the whole of the boiler was literally torn into shreds." Both tube sheets, so violent was the explosion, were torn from the tubes. The pieces were thrown in all directions, and one of the bomb-proofs was dislodged by the violence. Of the particulars of this explosion, in which only 13 minutes were occupied in raising the steam pressure from 29 to 53½ pounds in a boiler 12 feet wide, 15 feet long and 8 feet high, with 2518 feet of heating surface, Mr. Lawson appears to be profoundly ignorant. In this case the gentleman's apparatus or improvement could not have saved the boiler, unless it had added strength to the boiler shell. Of course, in the minds of some persons one of these explosions will weigh against the other, one proving one thing and the other something else. The first one was valuable, and Mr. Lawson may make his equally so. We should be glad to see him burst a large, weak boiler with 25 pounds of steam to the square inch. That it can be done we feel sure, and in the way he proposes. With a low pressure the experiment would be more conclusive than with the 380 pounds which he used. The latter was sufficient to have done the work without calling for the energy stored up in the water.

English and American Pumps.

Our recent article upon American and English pumps, published in our issue of June 2, has called out the following letter:

*To the Editor of The Iron Age.—Sir: As you have thought fit to devote an article in your edition of June 2, under the heading of "American and English Pumps," for the purpose of attacking the statements made by us in a letter recently published in the *Ironmonger*, London, we must ask you, in common fairness, to allow us a few words in reply.*

We will at the outset simply and fully endorse every statement contained in our former letter, and we are quite prepared to substantiate the following facts, viz.:

1. That American Pumps are more difficult of repair than those manufactured by us.

2. That American pumps are certainly not "the cheapest, most durable and efficient pumps made."

3. That our pumps, instead of weighing from 5 to 50 pounds heavier, are really a shade lighter than the American patterns, and will stand more wear and rough usage.

4. That the quality of iron used by ourselves is superior to that used by American pump makers; this is at once proved by comparing the castings comprising the respective pumps.

We have not in the above remarks spoken from mere assumption, but from practical knowledge, after having carefully examined and taken to pieces pumps made by all the leading American manufacturers and placed them side by side with those of our own make. Had you, sir, taken similar precautions your article would, most probably, never have appeared.

In conclusion, sir, we may add that we should speedily demonstrate in a practical manner to the American public and yourself the decided superiority of the English over American pumps if your manufacturers were not so conveniently sheltered behind the wall of protection.

Trusting you will insert this letter in your July 7 edition, I remain, sir, yours faithfully,

JOSPEH EVANS & SONS.

This letter deserves some reply from our American pump makers, and we should be glad to put it into their hands entirely. We think, however, that it is necessary for us to make some remarks upon certain statements utterly without foundation, and which it is hardly possible Messrs. Joseph Evans & Sons consider defensible. Upon the letter sheet on which this communication was written, there are seven forms of pumps illustrated. Of the seven, two are absolute copies in design of Douglass pumps. What departures there have been from the American patterns have been to increase the weight. These are hand pumps. In regard to the flag at protection, we wish to ask just one question of the Messrs. Evans. If what you say is true, why don't you keep these American pumps out of the English market? Just now large quantities of these same American hand pumps are being shipped by our manufacturers to their Liverpool agents. That these pumps are retailed in England is a sufficient answer to the wild remarks of our somewhat excited English friends. Not only do these gentlemen fail to keep American hand pumps out of England, but the same is true of Turkey, Australia and most of the colonial markets.

In steam pumps, a comparison of English and American patterns is equally unfavorable to the former. Of the four steam pumps shown among the illustrations of Messrs. Joseph Evans & Sons, two are copies of American patterns in their general features. One is a Woodward to all intents and purposes, and the other a Cameron. The superfluous metal shown is an ample refutation of their third statement. English pumps are notoriously heavy, a fact shown on every English steamer coming into New York.

The statement of Messrs. Joseph Evans

& Sons, to the effect that they have examined the leading American pumps and compared them with their own, is a most extraordinary one. We can account for it in two ways only. Either they have not done so, but hoped to make us believe that they had, or else their other statements were made with a full knowledge of their entire untruthfulness. Such a comparison would have been a complete demonstration of the superiority of the American pumps in the points mentioned in our article. There are many other points which we would be glad to have the manufacturers themselves present, and we accordingly turn over to them the above letter, to deal with it as they see fit. Our correspondents have invited the truth by attacking the reputation of American pumps in English prints, and they have no right to complain if unpleasant facts are called out in reply. The English reader is not such a fool as to be misled by bungling abuse of an important American product by a firm interested in the manufacture and sale of competing goods.

Sliding Scales.

The article on sliding scales, in our issue of June 30, has called out from the Amalgamated Association the statement that "there is now in force in the different mills throughout the United States, the workmen in which belong to the Amalgamated Association, 46 different sliding scales, governing as many different branches of labor." This is largely the result of the work of the last two or three years, as there were but few scales in force prior to 1879. It is certainly a source of congratulation that the causes of strikes are so much reduced as this number of sliding scales indicates, but it should still be borne in mind that in many cases these scales have only been accepted under protest, as the best thing that could be done under the circumstances, and that over certain of them contest will be waged some day. We do not say that the contest will be over scale or no scale, but over the basis of the scale. In anticipation of this struggle, and to avoid it if possible, as well as to avoid other troubles that may arise, as well as to settle them amicably when they do arise, we still insist that the thing to be done, and the thing that reasonable and sensible men ought to do, is to come to some agreement by which these questions shall not be settled by strikes, but by arbitration. One side or the other may assume to be able to decide what is just and right, and, having the power, may enforce their views; but the side that does this is unjust and arbitrary, and, if the laborer does it, he is as unjust and tyrannical as the capitalist. The fact that a man is a laborer does not alter the quality of the act.

Condition of the Building Trades.

The large and continued demand for all kinds of hardware, giving the unusually active summer trade which has been noted from week to week in our trade report, results from the exceptional and healthful activity of building operations throughout the country. It is probable that every reader of *The Iron Age* is aware of the fact that the building trades are prosperous at the present time, but few who have not been brought personally in contact with this activity in different parts of the country, realize how general it is or to what extent building operations are going on in every State and Territory.

Carpentry and Building for July presents a bird's eye view of the building industries throughout the whole extent of the country, giving special prominence to the question of wages. In order to obtain the information necessary to write such an article, nearly three thousand circulars of inquiry were sent out to subscribers to that journal located at as many different post offices. The response was very general, coming from every State in the Union, and embracing all the principal cities and towns as well as many places of less importance, making a more comprehensive report possible than has ever before been presented. The three lines of trade considered are carpenters, masons and house painters. We give the substance of the article referred to below:

To give the result of the survey in the fewest possible words, we might say that the "boom" extends all along the line. The building business is brisk. Mechanics in general are fully employed. Wages are fair, and in many directions there is an upward tendency. All the building that it is reasonable to expect can be completed before the bad weather of the fall and winter sets in, has been undertaken in nearly every community. In short, there has never before been such a season of general prosperity in the building trades in the history of the country.

Wages vary according to localities, being for the most part lowest where living is the cheapest, and highest where living costs the most. The ratio, however, is not maintained in all cases, and if close estimates were to be made we think it would be discovered that those who live and labor in communities where rents, provisions and supplies generally are cheap, have the advantage of their fellows in the larger cities, even though the wages of the latter are considerably higher. The average of nine principal cities situated in the East and on the Atlantic seaboard, considered together, shows that carpenters are receiving about \$2.50, masons a trifle over \$3, and painters about \$2.50 per day. By this comparison it appears that Boston is paying the average prices of the cities named, while New York and Philadelphia are paying above the general average. A like calculation made for nine of the principal cities of the Western States gives a very similar result, the exact figures being carpenters, \$2.44; masons, \$3.11, and

CONDITION OF THE BLAST FURNACES OF THE UNITED STATES, JULY 1, 1881.

(Compiled for *The Iron Age*).

Location.	CHARCOAL.				ANTHRACITE.				BITUMINOUS OR COKE.							
	Total number of stacks.	Number reported in blast.	Capacity per week.	Number reported out of blast.	Total number of stacks.	Number reported in blast.	Capacity per week.	Number reported out of blast.	Total number of stacks.	Number reported in blast.	Capacity per week.	Number reported out of blast.	Capacity per week.			
New England	17	12	910	5	365	1	1	160	0	0	0	0	0			
New York	16	11	749	5	255	42	25	5,870	17	3,300	0	0	0			
New Jersey						18	11	3,310	7	1,425	0	0	0			
Pennsylvania	38	24	1,230	14	689			3	2	100	1	50	0			
Lehigh Valley						50	37	9,954	11	2,990	0	0	0			
Schuylkill Valley						49	31	6,604	18	3,890	0	0	0			
Upper Susquehanna Valley						25	9	1,945	16	3,565	0	0	0			
Pittsburgh						42	28	4,995	14	2,275	0	0	0			
Allegheny Valley									15	12	7,930	3	950			
Shenango Valley									4	4	774	0	0			
Youghiogheny Valley									32	14	4,335	18	4,390			
Juniata and Conemaugh Valley									6	4	1,180	2	535			
Maryland	15	9	575	6	345	5	2	375	3	340	4	0	4	460		
Virginia	31	14	752	17	772	1	0		1	140	8	7	1,325	1	250	
North Carolina	7	0			7	264						6	3	1,400	3	510
West Virginia	6	1	100	5	410							17	11	3,750	6	2,020
Ohio												24	15	4,185	9	2,270
Mahoning Valley												13	10	1,647	3	465
Eastern, Central and Northern												17	10	1,640	7	1,145
Hocking Valley												4	3	950	1	150
Hanging Rock												8	6	1,975	2	570
Miscellaneous	31	24	2,254	7	570			3	268			3	1	400	2	200
Kentucky												4	4	1,400	0	0
Hanging Rock												3	2	290	1	150
Western region and Miscellaneous	10	5	550	5	390							14	9	4,150	5	2,025
Tennessee	8	1	50	7	570							1	0	0	1	280
Georgia	19	5	440	14	905							3	3	1,200	0	0
Alabama	8	3	335	5	148							12	3	685	9	1,356
Indiana	12	9	1,175	3	250							8	7	4,850	1	525
Illinois	1	0		1	140											
Michigan	27	18	3,820	9	1,545											
Wisconsin	11	8	971	3	370											
Minnesota	1															
Texas	12	3	685	9	1,356											
Utah	1															
Oregon	1															
Total	276	147	14,506	125	9,614	236	146	33,313	90	17,975	221	144	48,796	77	18,545	

</div

COVERT MFG. CO.,

SOLE MANUFACTURERS OF



COVERT'S PATENT HARNESS SNAPS, Chain and Rope Goods.

These goods are sold by all leading jobbers in General and Saddlery Hardware at manufacturers' prices.

Send for illustrated catalogue and price list.

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World's Best Can Opener.



Patented February 3, 1880.

This Can Opener has forced its way into the market by virtue of its **superiority**, it being formed of **One Piece of Steel**, and capable of standing ten times the use of an ordinary riveted or screw-blade opener.

The trade is hereby warned against purchasing the **World's Best Can Opener** from any one except ourselves or our authorized agents, our patents being secured to us in the most perfect manner.

LESTER & LYMAN MFG. CO., Factory, MILLERS FALLS, MASS.

Office and Salesroom, 115 CHAMBERS ST., NEW YORK.

STEPHENS'

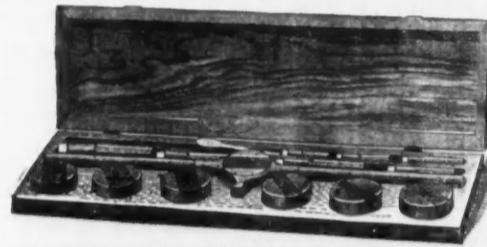
PAT. VISE.



Stationary and
The Best in

For Sale by the Trade.

STEPHENS PAT. VISE CO.
41 Day Street, New York.



LITTLE GIANT SCREW PLATES

MADE BY
WELLS BROS. & CO.,
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Manufacturers of Taps, Dies, Taper Reamers, Bolt Cutters (hand or power), Samson Tire Shrinker, Tire Bender, Foot Vise and other Blacksmiths' and Carriage Makers' Improved Tools. Send for prices and Illustrated Catalogue.

MERIAM & MORGAN PARAFFINE CO.,
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THE BEST GREASE NEW YORK, 143 Front St.,
BOSTON, 32 Oliver St.,

CHICAGO, FERRIS & AVERY,
Agents, 48 No. Wells St.

Heavy Bearings, &c.

REMOVAL.

Please notice that we have removed from No. 295 THIRD AVENUE to
No. 37 Warren Street, near Church St.,
Where we hope to be favored with a continuance of your generous patronage.

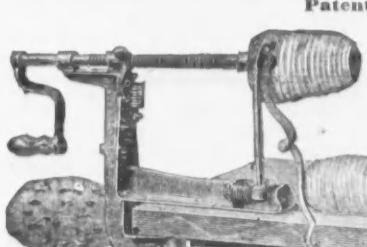
J. M. FARRINGTON & CO.,

Successors to DAY, FARRINGTON & CO., Manufacturers of

LOCKS, KNOBS, GONGS, BLANK KEYS,
Wrought Store Door and Flush Bolts, Silver Plated, Ornamental Bronze and other Hardware.

GOODELL'S WHITE MOUNTAIN POTATO PARER.

Patent Applied For.



The White Mountain Potato Parer is the only machine ever made that will not only pare a potato much better than it can be done by hand, take off the irregularities from every shape or kind of potato, but will go into and out of the eyes, and altogether at a saving of at least 50 per cent. It is free from the objections made to the old style of rattletrap, geared parers; is solid and substantial, cannot get out of order, and so cheap as to be within the means of everybody.

Almost any of the Potato Parers in the market seem as if they might do the work better "next time," but the "White Mountain" DOES IT NOW.

Every Machine warranted as represented.

Price to the Trade, \$8 per dozen.

GOODELL CO., Antrim, N. H., Sole Manuf'rs.

THE COMBINATION

IRON CLAD STEEL HORSE SHOE CO.,
SELF WELDING STEEL TIRE CO.,
BILLET AND WIRE CO.,

Sole and exclusive manufacturers of "Wheeler's Combination" Shoes, Shoe Bars and Toe Calks. Tire and Wire. Full particulars upon application by mail or otherwise to WARE B. GAY, Treasurer, 66 State Street, Boston, Mass. All persons cautioned against infringements.

THE STANDARD WOOD TRACK HANGER OF AMERICA.

For Sale by the Wholesale Trade
Generally, or the

KIDDER SLIDE DOOR HANGER CO.,

Sole Manufacturers,
ROMEO, MICHIGAN.

COAL, TIME
And LABOR SAVED! BY USING
MORGAN'S
Variable Blast Tuyere Iron

This cut represents the interior of the Tuyere, showing the rotating air tubes through which four different sized currents of air may be passed, thereby making any sized fire from two to 18 inches in diameter; for instance, if a large fire is being used and the next job should be a nail rod, we do not move or burn the large bed of coal,



but turn the small tube up and so concentrate the heat to the point desired.

The constant flow of water keeps the Tuyere cool and prevents cinders or clinkers from forming in the fire. To prevent the water from freezing in the pipes, the barrel is supplied with a faucet that empties the pipes but not the barrel. All the dirt from the fire sifts through the perforated fire cap into the dirt box, from which it is blown by the blast when the ball valve is raised for that purpose. I also furnish Tuyeres Irons without water attachment. See first issue of the month.

After having used your "Variable Blast Tuyere Iron" three months, I pronounce it perfect in every respect, and it actually saves from 10 to 50 per cent. of the coal.

CHAS. VAN HORN, Barville, Ill.

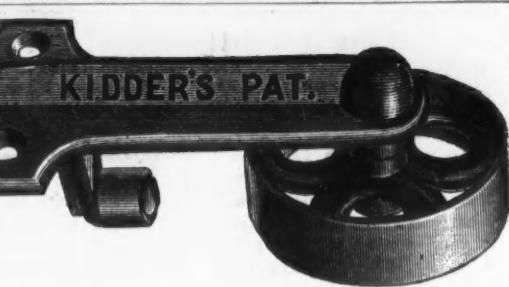
Send for price list and discount.

A. W. MORGAN, Patentee and Manufacturer,
Office, 52 Fence Block, Indianapolis.

With Attachment for
Taking the Tare.

Manufactured by

JOHN CHATILLON & SONS,



THE

"KIDDER."

Office of

PHœNIX CASTER CO.,

Indianapolis, Ind.

George A. Ruhleman & Co., St. Louis, Mo., have sold our Casters as follows:

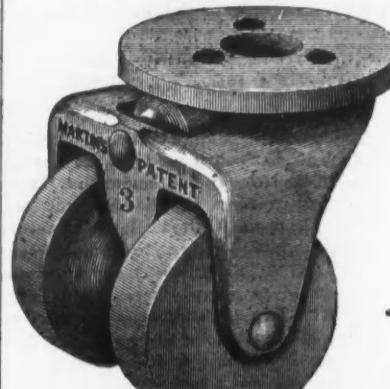
1878.....Amount, \$14.55

1879....." 246.76

1880....." 710.53

Our Caster is no experiment. The people will have it, if it does cost more than the shams on the market. Eight-inch Mill Files are no better stock. Introduce yourself to these goods by a very small stock order of our selection. Terms, 60 days. Ship them back if they fail in your esteem. Send for catalogue.

PHœNIX CASTER CO.,
Manufacturers,
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Our Drawer is so uniform, simple, strong and effective, that it has nearly

driven all competition from the market.



St. Louis, March 12, 1881.

Please send us Daisy Stove Trucks.

EXCELSIOR MFG. CO.

MARKET SCALES,



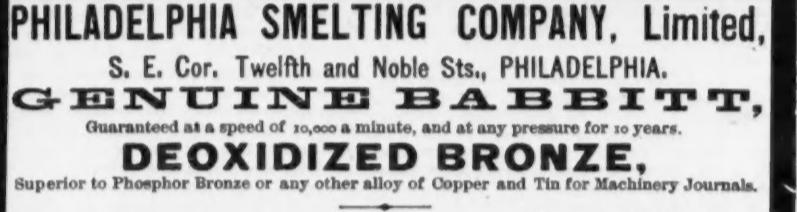
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89, 91 & 93 CLIFF ST., NEW YORK.

Send for Illustrated Price List.



PHILADELPHIA SMELTING COMPANY, Limited.

S. E. Cor. Twelfth and Noble Sts., PHILADELPHIA.

GENUINE BABBITT,

Guaranteed at a speed of 10,000 a minute, and at any pressure for 10 years.

DEOXIDIZED BRONZE,

Superior to Phosphor Bronze or any other alloy of Copper and Tin for Machinery Journals.

PHILADELPHIA SMELTING COMPANY, City.—GENTLEMEN: After a trial of eighteen months of your "Deoxidized Bronze" as journal boxes in our rolling mill, where great pressure is required, we take pleasure in recommending it as being superior to any we have heretofore used.

Very truly,

HENRY DIBSTON & SONS.

PHILADELPHIA, October 4, 1881.

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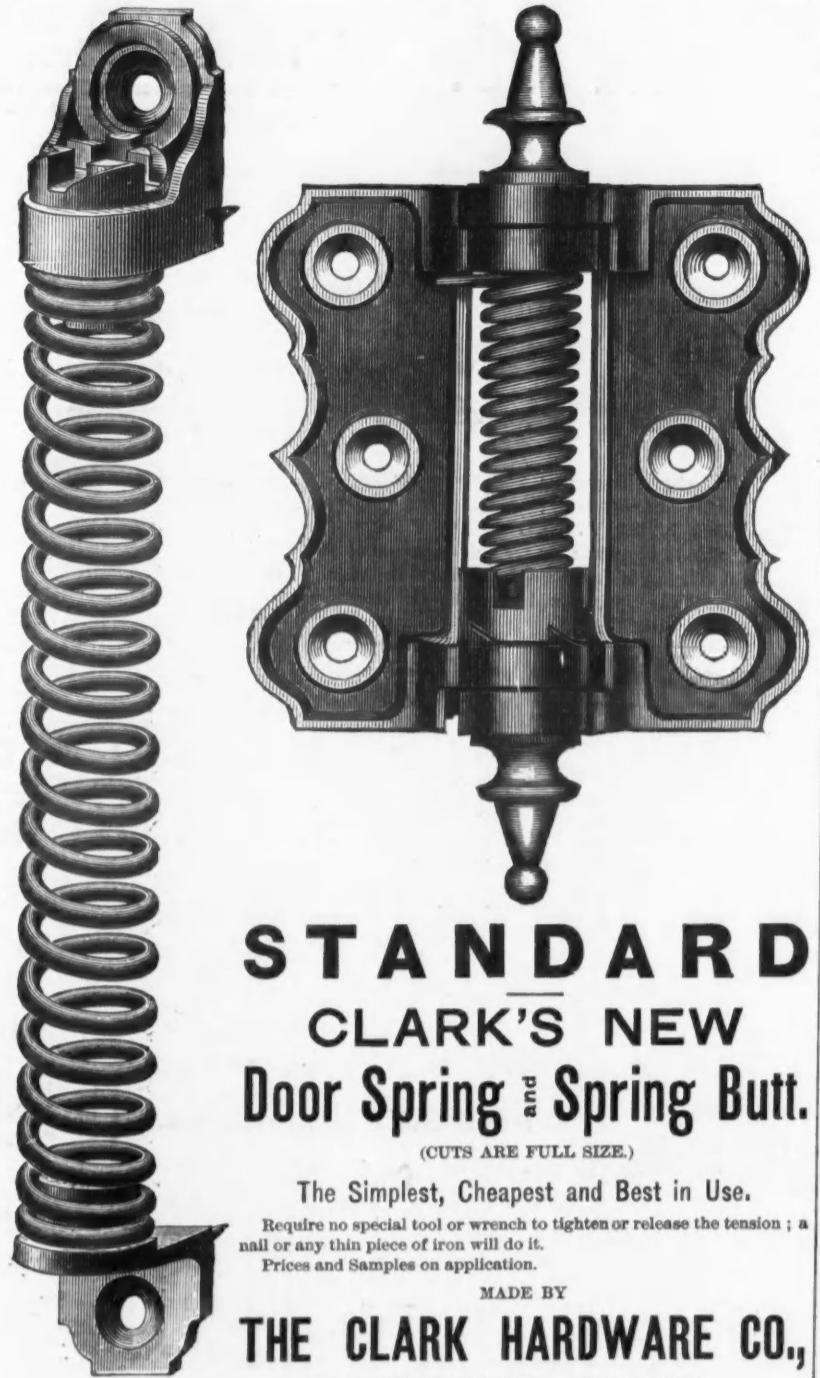
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STANDARD CLARK'S NEW Door Spring and Spring Butt.

(CUTS ARE FULL SIZE.)

The Simplest, Cheapest and Best in Use.
Require no special tool or wrench to tighten or release the tension; a nail or any thin piece of iron will do.

Prices and Samples on application.

MADE BY
THE CLARK HARDWARE CO.,
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Gentlemen.—This cut illustrates our
CAST IRON

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which are superseding entirely the Tin Lamps wherever introduced, in consequence of their durability. They are now extensively used in the Iron Districts of Ohio and some in Pennsylvania.

We call your attention to and solicit your order for them, confidently asserting that they are an **A No. 1 article in every respect.**



Sample sent if desired.
PRICE, \$12 PER DOZEN.

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Exclusively for the
Analysis of Ores of Iron, Pig and Manufactured Iron, Steels, Limestone, Clays, Slags and Coal for Practical Metallurgical Purposes.

No. 339 Walnut St., Philadelphia.

With Branch at Warrenton, Virginia,

J. BLODGET BRITTON.

This laboratory was established in 1866, at the instance of a number of practical iron masters, experienced to a knowledge of metallurgy, and based upon the chemical composition of the substances above mentioned, for smelting and refining purposes. The object being to make it at once a convenient, practically useful, and comparatively inexpensive adjunct to the Furnace, Forge and Rolling Mill.

CHARGES TO IRON WORKS.
For determining the per cent. of Pure Iron in an ordinary Ore.....\$4.00

For the per cent. of Pure Iron, Sulphur and Phosphorus in do.....12.50

For each additional constituent of usual occurrence.....1.50

For those of unusual occurrence or difficult to determine, the charge must necessarily depend upon circumstances.....7.00

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For the per cent. of Carbonate of Lime and insoluble Silicious Matter in a Limestone or each additional constituent.....12.50

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Superior to any other Light for Mining Purposes. Manufactured by

JAMES BOYD'S SON,

Nos. 10 & 12 Franklin St., New York.

Grindstones, Emery, &c.

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GRINDSTONES.**

Berea, O., Nova Scotia, & other brands
283 and 285 Front Street, New York.

GEO. CHASE,

The largest manufacturers in the world of

OIL STONE

Of all description.

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Superior Ohio Grindstones, manufactured by P. L. Cole, Constitution, Ohio, will be supplied to the Southern trade at lowest possible rates by

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Manufacturers of
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Stones for Machinists, Carpenters, Farmers and
Glass Cutters constantly on hand and cut to order.

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of genuine Nova Scotia and other grits from our own quarries. Mounted stones and fittings, scythe and oil stones, polishing grits, &c.

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Large stock on hand, especially suited to Saw and Shovel Manufacturers, at bottom prices.

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IRVINE, TOWNSEND & CO.,

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Send for quotations and samples.

WASHINGTON NOTES.

Factory Inspectors and Workmen's
Influence in Germany.

(From Our Own Correspondent.)

WASHINGTON, D. C., July 12, 1881.

The Department of State has received a copy of the "Reports of the Inspectors of Factories for the German Empire," which gives much interesting and important information on the system established in that country in the interests of the general administration of factories and of those employed in them. This system of surveillance was instituted in 1853 in the Rhine Provinces of Prussia, but it was not until 1878 that the employment of these officers became general throughout the empire. About a year ago a law was introduced into the Bundesrat providing for the protection of workmen in factories against injury and loss of life, but was withdrawn on account of the opposition of the manufacturers, and a commission of experts was appointed to frame a more acceptable measure. This commission has submitted a code of rules and regulations for the protection of workmen in factories against injury and loss of life. Among the provisions are—sufficient light to suit the work; 175 cubic feet of air at least to each workman; protection against the destructive influence of poisonous gases and dust; proper fire escapes; safety lamps where explosives are made; sufficient width of passage guards against machinery, &c.

In this connection was submitted the draft of a proposed law in relation to the insurance of employees in mines, factories and other industries against accident and death. This law proposes that all employees in mines, salines, quarries, docks, buildings and iron mills whose income does not exceed 2000 marks (about \$480), shall in future be covered in an insurance bureau. This bureau is to be established, controlled and managed by the imperial government in accordance with laws enacted by the Bundesrat, and in the interest and on behalf of the insured. Insurance is to be against accident or death received in performance of work. All industries are included, except navigation and railways. The object of this insurance is to indemnify the workman in case of his becoming disabled and prevented from following his occupation for four weeks or more, or his family or heirs in case of death, the indemnity to be paid as follows:

1. Cost of care after commencement of fifth week. 2. A pension after that time, in case of total disability, amounting to 66 2/3 per cent. of yearly income; and in case of partial disability, not less than 25 per cent. and not more than 50 per cent. of the yearly income. In case of death: 1. Ten per cent. of yearly income for funeral and kindred expenses. 2. If death occurs four weeks after the accident or later, total cost of medical attendance and 66 2/3 per cent. of earnings. The heirs of the deceased are to receive a yearly pension from the date of death.

The industries named are required to insure their employees collectively, for which a certain premium is to be paid, regulated quarterly, and in accordance with the risk and amount of wages paid. For those earning yearly 750 marks (about \$180), two-thirds of the premium to be paid by the employees and one-third by the poor association of the district. For those earning yearly more than 750 marks, half of the premium is to be paid by the employer and half by the insured. The employer is compelled to report every accident to the Police Department within three days, and the proper agency of the Imperial Insurance Bureau is to make an investigation. After the establishment of the grade and character of the injury, the insured will receive a proper certificate. There are also further provisions for the execution of this law. The report submitted in this connection by the representative of the United States, says that great activity prevails among statesmen and legislators in the interests of the great industries of the empire, not only in their encouragement, but in guarding the interests and ameliorating the condition of the workingmen.

Resources of Liberia.

The new United States Minister to Liberia, Rev. Henry Highland Garnet, expresses himself very favorably in regard to the prospects of that country. He says the outlook of Liberia is encouraging. There is already a considerable trade with England, Germany, France and Denmark. British and German capitalists are about to construct a railroad from Monrovia through the country to the interior wilds. The Liberians are, however, not in favor of European capital. They have become a nation under the fostering care of the United States, and they desire to repay this country by opening it to the vast and varied possibilities of their commerce. It seems strange that the United States should, after founding a nation, let all the benefits accruing from its existence be received by other countries. The Liberians are anxious for closer commercial relations with this country and are prepared to send here products of great value to us. If the time ever comes when the talked of line of steamers between New York and the Liberian ports are in operation, the country will begin to realize how great are the advantages to be derived from a close commercial relation with the African Republic. Coffee, cotton, dye woods, tobacco and almost every variety of tropical production Liberia raises and exports. As the market spreads the production will, of course, increase.

"The Liberians are not able, alone, to develop the resources of their country. Other nations see the coming importance of Africa, and England on the south and France on the north are already in the field and are beginning to reap the harvest. Will the United States, with such an opportunity ready at their hands, stand by and see the trade of Africa absorbed by other nations, and European influence dominant in the

dark continent? Liberia is the only real Republic in Africa, and, if properly cherished, it will be the fountain head from which not only civilization but republicanism will disseminate itself over Africa.

"It will not be many years before the importance of Africa will be realized. In fact, this country seems to be the only one that has not already seen her growing greatness. It is certainly the coming continent, and capital spent in opening up her resources will be well invested. There are in Liberia forests of valuable wood, mines of gold, silver and iron, and a soil capable of producing the most valuable crops. The cotton product alone, if developed, would be immense. There is a strong feeling of love for this country, and the United States would have little difficulty in monopolizing the trade of the country. When I reach my post I shall do all in my power to bring the United States and Liberia into more intimate relations."

Imports of Metals &c., at New York, for Three Months.

Below we give a comparative statement of the value of the imports of a few leading articles for the second quarter in each of the last three years.

	1870.	1871.	1881.
Copper and Ore.....	\$10,222	\$20,312	\$23,015
Iron bars.....	35,235	52,864	50,802
Iron, sheet.....	63,817	3,352,033	1,553,770
Lead.....	31,074	153,359	30,685
Spelter.....	5,706	101,753	72,134
Steel.....	23,874	105,028	27,824
Tin, slabs.....	174,401	1,107,104	166,351
Tin, plates.....	93,588	1,734,010	60,818
Zinc.....	1,770,316	2,782,010	1,016,327
Zinc, lbs.....	10,939	53,270	14,164

The various articles imported within the last quarter are named more specifically, as follows:

	Quantity.	Value.
Anvils.....	2,122	\$21,729
Bismuth.....	11	5,110
Bronze goods.....	258	26,692
Bronze, cast.....	223	51,485
Chains and anchors.....	399	2,105
Copper.....	3,015	81,015
Clocks.....	1,500	45,872
Clocks.....	254	37,719
Pins.....	51	9,100
Gas fixtures.....	8	3,576
Gas pipes.....	1,631	222,826
Hardware.....	218	18,302
Iron hoop, tons.....	102	1,065
Iron pig, tons.....	74,094	1,553,770
Iron, sheet, tons.....	494	30,685
Iron, railroad, bars.....	139,242	1,110,131
Iron, cotton ties.....	1,200	1,004
Iron tube.....	320	1,593
Iron ore, tons.....	59,070	178,110
Iron wire, tons.....	17,106	21,139</td

SPRING HINGES.—SCOVILL MANUFACTURING CO.

WROUGHT IRON WITH BRASS SPRINGS.

Packed with Screws.

SINGLE JOINT.

	Per doz. Pairs.		Per doz. Pairs.
2½ inch, No. 301.	\$3.60	2½ inch, No. 311.	\$7.20
3 " No. 303.	4.40	3 " No. 313.	8.80
4 " No. 305.	6.75	4 " No. 315.	13.50

DOUBLE JOINT.

	Per doz. Pairs.		Per doz. Pairs.
2½ inch, No. 311.	\$7.20	2½ inch, No. 313.	8.80
3 " No. 313.	8.80	4 " No. 315.	13.50
5 " No. 315.	16.50		

WROUGHT BRASS.

SINGLE JOINT.

	Per doz. Pairs.		Per doz. Pairs.
2½ inch, No. 1.	\$3.00	2½ inch, No. 7.	\$6.60
3 " No. 3.	4.50	3 " No. 9.	8.30
5 " No. 5.	7.50	5 " No. 11.	16.50

DOUBLE JOINT.

	Per doz. Pairs.		Per doz. Pairs.
2½ inch, No. 7.	\$6.60	2½ inch, No. 9.	8.30
3 " No. 9.	8.30	4 " No. 11.	16.50
5 " No. 11.	16.50		

SCOVILL MANUFACTURING CO.,

WATERBURY, CONN.

Depots: 419 & 421 Broome Street, New York.
177 Devonshire Street, Boston.
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EXCELSIOR LAWN MOWER



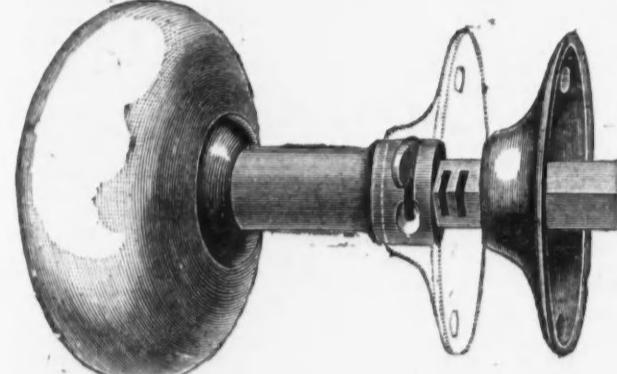
We make Seven Sizes of Roller Mowers and Six Sizes of Side-Wheel Mowers. We claim for our Mowers

Perfect Work, Light Draft and Simplicity.

We have received many first premiums in competitive trials with other Mowers, both in this country and abroad. We have special patterns of Mowers for export, meeting the requirements of every market. Our new Horse Mower is conceded to be the *Lightest and Best* Horse Lawn Mower ever made. N. B.—Horse and Hand Lawn Mowers are alike guaranteed in all respects. Send for Illustrated Catalogue. Address

CHADBORN & COLDWELL MFG. CO.,
Newburgh, N. Y.

IMPROVED FASTENING FOR



DOOR KNOB SPINDLES.

Patented May 21, 1872.

The above cut represents an important improvement for securing the Door Knob neatly and securely on the spindle without the use of screws. Architects, mechanics and dealers pronounce this device superior to anything of its kind in the market. In fact, no first-class Door Knob is complete without it. No extra cost to dealer or consumer.

Manufactured only by

THE CLARK MFG. CO.
Buffalo, N. Y.

BAGNALL & LOUD,
BOSTON, MASS.,

Sole Manufacturers in U. S. A. of our Celebrated

METALINE

AND

Star Roller Bush
Tackle Blocks.

Send for Illustrated Catalogue.
New York Warehouse, 33 South St.



HARROD PATENT.



THE IRON AGE.

Patented Articles of Malleable Iron.

Hammer's Malleable Iron Oilers.

Three Sizes.

Nos. 1, 2 & 3.



No. 1.

Hammer's Adjustable Clamps.

Hammer's Mall. Iron Hand Lamps.

Hammer's M. I. Hanging Lamps.

NEW pattern Heavy Screw Clamps; strongest in the market.

For sale by all the principal Hardware Dealers.

Send for Price List.

Malleable Iron Castings of superior quality, and Hardware Specialties in Malleable Iron made to order.

HAMMER & CO., BRANFORD, CONN.

J. F. WOLLENSAK'S

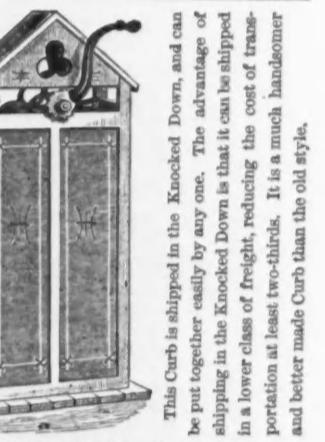
PATENT

Transom
Lifter
and Lock.

For all kinds of Transoms, Fanlights and Skylights.

Send for catalogue and price list.

J. F. WOLLENSAK,
Patentee and Sole Manufacturer,
CHICAGO, ILL.



This Curb is shipped in the Knocked Down, and can be put together easily by any one. The advantage of shipping in the Knocked Down is that it can be shipped in a lower class of freight, reducing the cost of transportation at least two-thirds. It is a much handomer and better made Curb than the old style.

Creasey's Ice Breaker.

In Use by
MEAT & FISH
Packers,
ICE CREAM
Makers,
HOTELS
AND
CONFECTIONERS.
FIVE SIZES.
Saves Time, Money
and Labor.

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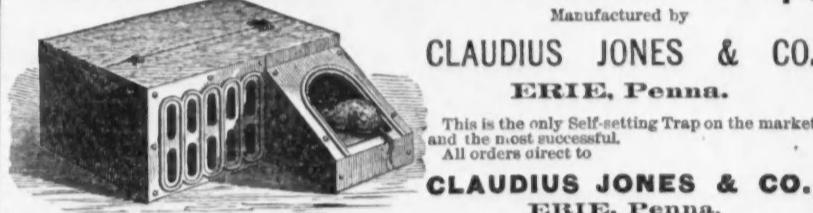
THE AMERICAN MACHINE CO.,
MANUFACTURERS OF

HARDWARE SPECIALTIES.

Office and Factory: Lehigh Ave. and American St., Philadelphia. Branch House: No. 128 Chambers St., New York.

SPECIALTIES: Fluting Machines, Hand Fluters, Plaiting Machines, Christmas Tree Holders, Bickford Portable Pump, Mrs. Potts' Patent Cold-Handle "Crown" Irons, Ice Cream Freezers and Cake Mixing Machines.

Delusion Rat and Mouse Trap,



Manufactured by CLAUDIUS JONES & CO., ERIE, Penna.

This is the only Self-setting Trap on the market, and the most successful.

All orders direct to CLAUDIUS JONES & CO., ERIE, Penna.

BENTLEY'S Perfect Blind Slat Holder.

Patented.

SUPERIOR TO ALL OTHERS.

For tightening the Slats of Window Blinds and holding them at any required angle.

The sunlight is let in or shut out at will.

The blinds are made a much better protection from cold, because when the slats are shut they are so kept by the Holder and cannot be moved by the action of the wind.

Noisy rattling of the slats is prevented.

The holder is securely held by its spring and the sharp points at each end.

As it is made of brass it will not rust.

It cannot get out of order.

Its superiority over other holders is evident.

It requires no screws or nails to fasten it to the blind. Any one can apply it.

It cannot get loose or deface the blind as others do.

Retail Prices.
No. 1, For Outside Blinds, 5 cents each; 50 cents per dozen.
No. 2, For Inside Blinds, two for 5 cents; 25 cents per dozen.

At which prices samples will be mailed postpaid.

Trade Prices.
No. 1, \$6.00 per gross; discount 50 per cent.
No. 2, \$3.00 per gross; discount 50 per cent.

FOR SALE BY THE TRADE.

In case your jobbing house cannot supply you, orders will be promptly filled by

R. W. BENTLEY, Sole Manufacturer,

41 FOURTH ST., BROOKLYN, E. D., N. Y.

See Illustration on page 114.

INDUSTRIAL ITEMS.

MAINE.

The top house, elevator and stock house of the Katahdin Iron Works were burned last month, but the company have rebuilt and now have everything in readiness for business. Before the fire the company were making about 500 tons of iron per month. The present month and hereafter they expect to make about 600 tons monthly. This iron is shipped to all parts of the country, but is used chiefly in the manufacture of car-wheels. Heretofore they have employed 20 four-horse teams in hauling their iron to Bangor, the nearest railroad station, but on the 27 ult. a company was organized, under the general railroad law of Maine, to construct a narrow-gauge road from Bangor to the works, a distance of 20 miles. This road is to be called the Bangor and Katahdin Iron Works Railway, and O. M. Davis, Jr., of Bangor, has been elected president and Henry McLaughlin treasurer.—*Boston Commercial Bulletin*.

J. G. Torrey & Son, of Rockland, manufacturers of brass ship fastenings and trimmings, have increased the capacity of their works fully one-half during the past year, and are now so driven with orders that they intend to make another enlargement soon. This business was established in 1854, and has become one of the largest concerns of the kind in New England.

MASSACHUSETTS.

The Union Needly Works, at Middleboro', have shut down for two weeks.

J. A. Colvin & Son have sold their iron foundry at Athol to Worcester parties.

The Florence Sewing Machine Works, at Northampton, shut down on Saturday for a week or more to make repairs upon the engine.

The Chapman Valve Manufacturing Company, at Indian Orchard, employ 106 hands, while six months ago they only had 50. They have begun the foundations for a 50 by 60-foot brass foundry southeast of the main shop, and for several small buildings on the premises.

The Mason Machine Works, of Taunton, have manufactured and sent to the purchasers of the Campbell Press Company 525 presses to the 1st of July, about one per day since they began turning them out.

That the Chicopee Falls manufacturers are busy is evidenced by the following items: Recently the Chicopee Manufacturing Company sent off four carloads of cotton goods. The Belcher & Taylor Agricultural Tool Company two carloads of tedders and rakes. The Lamb Company one car of knitting machines. B. & J. W. Belcher, one car of mowers and tedders.

The Cape Ann Forge Works, Gloucester, have just added to their equipments a 600-pound hammer, built by Morgan, Williams & Co., of Alliance, Ohio, and having all the latest improvements (new furnace, boiler and tools to correspond) are now prepared to take orders for a heavier class of forgings.

RHODE ISLAND.

Fred. I. Marcy & Co., manufacturing jewelers, of Providence, are doubling the capacity of their shop, which will increase the number of their employees from 45 to about 100.

The McWilliams Manufacturing Company of Providence, manufacturers of tools and machines for jewelers, silversmiths and watch-case manufacturers, have recently added about 33 per cent. to their general facilities. They have just put up an additional building, 40x78, for an office, blacksmith shop and pattern shop.

NEW YORK.

The machine works of Grant & Bogert, now in process of erection at Flushing, will be in running order by the 1st of August. The works will be of brick, the dimensions being 200 x 45 feet, and one story in height. Upward of \$10,000 worth of machinery has been purchased from the Pratt & Whitney Company for the works. The firm have also contracted for a 40-horse-power Buckeye engine and a 60-horse-power patent water front boiler.

Breckley Furnace (charcoal), in Columbia County, is now called Chatham Furnace, and is operated by the Chatham Furnace Company. She is making 70 tons per week charcoal iron.

D. E. Paris & Co., of Troy, recently burnt out, have leased the Wager Foundry property, and are moving in. They expect to begin work at once.

PENNSYLVANIA.

The Elkins Manufacturing Company, of Philadelphia, in February last took possession of a disused planing mill, of moderate dimensions, on the west side of Tenth street, below Diamond, and, after enlarging it to three times its former dimensions, have entered into the manufacture of car builders' and cabinet makers' hardware, &c., on a large scale, under the management of Francis Clamer, the inventor of what is known as the "Ajax" metal, which will enter largely into the articles and goods manufactured at these works. This metal, which is said to possess extraordinary hardness and strength (having, it is claimed, 29,300 pounds tensile strength to the square inch), is a chemical amalgamation, of which copper is the foundation. For journal and machinery bearings it is said to be far superior to phosphor-bronze. It is now pretty extensively used in the manufacture of what are commercially known as "Boss" watch cases. Mr. Clamer invented this metal about 16 years ago, and manufactured it to a limited extent until recently, when Mr. Elkins, becoming aware of its usefulness, especially in the manufacture of stop cocks, valves, &c., in use in oil refineries and chemical works, in preserving them from injury by acids, a difficulty said to have never before been surmounted, made a business arrangement with the inventor, and, investing considerable capital in buildings and machinery, has gone into the manufacture of such articles into which the Ajax metal can be profitably introduced. The buildings now complete and in use are one, two and three stories high, and a portion of them is supplied with the necessary machinery. Additional machinery is being put in place as fast as it can be received from the builders. Fifty hands are now working, but when the concern is fully sup-

piled with machinery it is stated that 300 hands will be employed. Upward of 14,000 pounds of Ajax metal are made daily, and its use in the works with the demand for it elsewhere is fully up to the supply. The making of the Elkins gas machine is also carried on at this establishment, and a considerable business is done in its manufacture. Frames for street lamps are also made here in large quantities. The manufacture of tinmen's solder is still another item of trade carried on.

Verkes & Plumb, edge tool manufacturers, Church street and Trenton Railroad, will shortly erect new works at Whitehall, near Bridesburg, Philadelphia. Four acres of ground will be taken up and the following buildings erected: Forge shop, 50 x 200 feet; grinding and polishing house, 30 x 175 feet, two stories; warehouse, 30 x 175, two stories; tempering shop, 30 x 60 feet; engine room, 38 x 50, two stories. The buildings will be pushed to completion and will be occupied about the middle of November.

A pressed Philadelphia brick, from the new City Hall in that city, was subjected to a compression test in the powerful hydraulic press at the Watertown Arsenal last week and stood the test at 500,000 pounds, remaining between the plates full five minutes. From appearances the pressure could have been increased another 100,000 pounds without affecting it.

The William Cramp & Sons' Ship and Engine Building Company are now building four large iron steamboats for the Iron Steamboat Company of New Jersey. Two have been delivered and the other two are nearly completed, and will be ready for delivery on July 1st. Three of these steamers are of the same size, will each carry 1800 passengers, and are the most complete steamers ever built in Philadelphia. The Perseus, on her trial trip on June 4th, attained a speed of 20 miles an hour. The Cramps are also building two large iron steamships of 2000 tons each, for the Miners' Transportation Company of Baltimore. These two steamships are each 250 feet in length, 38 1/2 feet beam, with 27 feet depth of hold. They will be driven by compound engines of 1000 horse-power. Cramps are also building a large iron steamship for Alexandre, of New York, to be called the City of Madrid. She will be the largest ship of this line, having registered tonnage of 2600 tons; 319 feet on load line and 342 feet in length over all, with three iron decks. The Messrs. Cramp have also laid the keel for an immense steamship to be built for the Pacific Coast Steamship Company, which will be named the Queen of the Pacific and will be 345 feet in length, 38 1/2 feet beam, 26 1/2 feet hold, with registered tonnage of 2600 tons; the engines will be 3000 horsepower. The steamship will have two iron decks. The steering apparatus will be worked by steam power. She will have three masts, and is expected to attain a speed of 16 miles an hour. There will be accommodations for 1000 passengers; the cabins will be finished in the finest style and upholstered in the most luxurious manner, and everything will be completed and ready for delivery in about six months. The Messrs. Cramp have a frontage on the river at their shipyard and machine shops, at Beach and Norris streets, of 800 feet, and at their basin dock and railway, at Beach and Norris streets, of 230 feet, making a frontage on the Delaware of 1030 feet. Their dry dock is capable of taking in the largest ship, being over 460 feet long, 110 feet wide and 24 feet deep. They have now 2000 men employed, and the weekly pay-roll amounts to \$17,000. They use about 50,000 tons of iron a year.

The works of the National Gas Company, at Norristown, have been rebuilt since the late fire in a manner much superior to the former buildings. New machinery has been put in throughout, and the entire works have a busy look.

The contracts made during the past few months will keep the works going for some time, and the prospects are that before the winter sets in fuel gas will be in active use in several new localities.

Black lead crucibles are among the articles of American manufacture which appear to meet with growing favor in Europe. R. B. Seidel, of Philadelphia, has recently made a shipment to Moscow, Russia, where they have a decided preference over English crucibles. Mr. Seidel has also had inquiries which will probably lead to business with parties in Scotland, Belgium, France and other countries in Europe.

At the Scott Foundry, Reading, business has been very brisk since early spring, and the machine shop has been in operation day and night. The second of three large cotton presses ordered is nearly finished, and a number of the castings have been made for the third one.

Springhill Furnace will be blown out this week in order that some necessary repairs may be made. This is one of the oldest furnaces in the State, and is owned and operated by the Fairchance Furnace Company.

Messrs. Snell & Meharg, machinists, Court street, between Second and Third streets, Reading, are at present engaged upon three vertical and two horizontal engines. They are kept constantly busy, and will soon make extensions to their building, to allow more scope for operations.

The last one of the five large passenger locomotives built at the shops of the Reading Railroad Company is very nearly finished, and four six-wheeler engines have been commenced. The first one of these has been put on the stocks and rapid progress is made on it. How soon the six-wheelers will be finished will depend upon the amount of repair work required on locomotives brought into the shops from the road. The work in the shops has been very plentiful for some time, and in some of the departments overtime has been made.

The Bloom Furnace, in the Upper Susquehanna Valley, is out, but will probably blow in again in a few days.

The tube departments of the Reading Iron Works are busily engaged on a contract for 60 miles of pipe and casings for the Standard Oil Company. The pipes are 2-inch and the casings 6-inch. A number of extra hands have been employed.

Stack No. 1, of the Dunbar Furnace Company, is again in blast and making between 70 and 80 tons of metal per day. Stack No. 2 will be blown in as soon as the new hopper arrives and is put in place.

Verkes & Plumb, edge tool manufacturers, Court street, between Second and Third streets, Reading, are at present engaged upon three vertical and two horizontal engines. They are kept constantly busy, and will soon make extensions to their building, to allow more scope for operations.

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July 14, 1881.

in unmistakable language and make a denial? Why don't the Pittsburgh manufacturers do so? They have been invited to do so on several occasions, but they seem to prefer to remain under the obloquy of the insinuation rather than to indignantly deny it. Is it that they cannot truthfully deny it, and hope to evade censure by employing *The Iron Age* to divert public attention by making mouths at us? The *American Manufacturer* speaks of the matter as "humorous," and we suppose those who are profiting by the situation view it with much hilarity, and congratulate themselves upon the success of their little scheme, and fairly dance with glee at the enlistment of so staid and respectable a paper as *The Iron Age* as their defender and champion."

It is of no moment whether the charge was made positively and directly or otherwise. The *Age of Steel* gave currency to a charge in which there was not one word of truth, and which has not a shadow of evidence to sustain it. Furthermore, the burden of proof does not devolve upon us. If, in its superservicable zeal in cultivating what it considers a local interest, a local newspaper circulates or gives currency to a gross libel on the manufacturers of another part of the country, it is not the business of *The Iron Age* to disprove its assertions. They disprove themselves. If our Western contemporary wants any better evidence of the groundlessness of its charge than its inherent absurdity, we can say, on the best authority, that only one person connected with the rolling-mill interest of Cincinnati is known to have held or expressed the idea that the Pittsburgh manufacturers are or have been instrumental in promoting, encouraging or sustaining the Cincinnati strike, and this man is simply a selling agent for the product of one of the mills outside of Cincinnati. We have the authority of the owner of one of the largest Cincinnati mills for saying that the Cincinnati manufacturers do not believe the story in whole or in part. Evidently the "certain circles" in which our Western contemporary gathers its information are not iron circles, and in this matter it is simply lending its columns to spread a silly rumor which no one who knows anything about it believes for a moment. No one with any right to do so has called on or expected the manufacturers of Pittsburgh to deny the charge, and they would be extremely foolish to take any notice of it. What our Western contemporary says of the position of *The Iron Age* in this matter is immaterial.

Exports and Imports for Ten Months of the Fiscal Year.

According to the last summary statement of the imports and exports prepared by the Bureau of Statistics, the value of the dutiable imports for the ten months ended April 30, 1881, was \$359,672,330 for the same period in 1880, \$367,585,451—a falling-off of about \$8,000,000. Among the leading dutiable articles imported during the ten months were the following.

	IRON AND STEEL	
Pig iron.....	1881. \$6,887,912	1880. \$6,261,640
Bar iron.....	2,223,392	4,041,810
Railroad iron.....	2,223,392	1,154,710
Old and scrap iron.....	8,855,105	8,855,813
Steel, ingots, bars, &c.....	4,444,676	3,152,000
Steel rails.....	4,776,094	1,029,890
Tin in plates.....	11,705,009	14,554,974

The total value of non-dutiable and dutiable imports for the ten months was \$52,213,256 in 1881, and \$542,563,503 in 1880. These imports were brought in as follows:

	IRON AND STEEL	
In cars and other land.....	1881. 1880.	
vehicles.....	\$14,171,102	\$12,593,402
In American vessels.....	102,540,841	120,106,562
In foreign vessels.....	411,503,313	409,783,539

American vessels lost nearly \$18,000,000, while foreign vessels gained nearly \$2,000,000.

During the period indicated the exports of domestic merchandise amounted \$759,744, 262 in 1881 and \$688,479,487 in 1880, an increase of \$71,264,775. The following were the values of the leading articles:

	1881.	1880.
Cotton.....	\$22,674,661	\$18,668,841
Wheat.....	143,679,174	101,653,70
Wheat flour.....	37,815,106	29,480,864
Indian corn.....	41,455,156	40,210,482
Horned cattle.....	11,740,645	9,370,103
Bacon and hams.....	55,101,315	47,134,251
Lard.....	29,831,815	22,371,546
Chips.....	3,120,669	8,28,140
Fresh beef.....	5,844	6,027,65
Butter.....	5,607,840	5,548,048
Preserved meats.....	5,380,872	7,243,943
Pork.....	7,205,583	4,010,585
Leaf tobacco.....	10,599,497	14,564,971
Illuminating oil.....	26,379,001	28,671,667

The exports of domestic merchandise for the ten months were carried as follows:

	1881.	1880.
In cars and other land.....	1881. \$1,040,285	8,469,28
vehicles.....	\$8,469,28	\$8,469,28
In American vessels.....	97,682,353	140,101,21
In foreign vessels.....	698,092,651	595,051,290

Of the \$71,000,000 increase, American vessels gained \$8,200,000 and foreign vessels gained \$62,000,000.

The New York Chamber of Commerce, in their pledge to Mrs. Garfield of \$250,000 to be presented to her, both as a token of their sincere esteem and sympathy, and as a means of relieving the mind of the President entirely from anxiety with regard to the future of his family, have performed an act worthy of the merchants of New York and creditable to the nation. No tribute could be more fitting or more gracefully bestowed.

According to a bill published in Mexico July 2, all foreign merchandise now free from duty will be subject, on and after the 1st of November, to a duty of 50 cents per 100 kilos. of its weight, petroleum to 80 cents, and other merchandise, besides the ordinary duties, to an additional tax of 75 cents per 100 kilos.

Special Notices.

New and Second-Hand MACHINERY.

One Horizontal Engine, 15½ in. x 30 in. Todd & Rafferty. One Horizontal Engine, 3 in. x 6 in. One Beam Corliss Engine, 500 H. P. Portable Engines from 10 to 25 H. P. Two Horizontal Return Turb. Boilers, 100 h. p. each. One Hor. Tubular Boiler, 6 ft. x 14 ft., 67 in. tubes. One Tuber. Boiler, 4½ in. x 13½ ft., 43 in. tubes. One Locomotive Steel Boiler, 30 h. p.

MACHINISTS' TOOLS.

Twelve Lathes, 22 x 12. New. Ten Lathes, 18 x 8. New. One Cameron Pump, No. 2. One Root Gas Exhauster, No. 2. One Upright Mill, 24 in. x 12 in. One Milling Machine. Pratt & Whitney. One Milling Machine, 6 in. Saunders' Sons. One Tapping Machine, 1½ in. Saunders' Sons. One Hydraulic Press, 8 inch ram. One 200-ton Hydraulic Press and Pump. One Known Special Pump, No. 7. One Peck, Stow & Wilcox Foot Press. One Peck, Stow & Wilcox Foot Press. One Upright Drill, 36 inch. One Burleigh Rock Drill, No. 4. New. One Hotchkiss Compressed Air Halmmer. One Wrought Iron Vises, all sizes. One Direct-Acting Niagara Steam Pump, 10-inch stroke. One Direct-Acting Niagara Steam Pump, 12-inch stroke. One Direct-Acting Niagara Steam Pump, 14-inch stroke. One Direct-Acting Niagara Steam Pump, 16-inch stroke. One Direct-Acting Niagara Steam Pump, 18-inch stroke. One Direct-Acting Niagara Steam Pump, 20-inch stroke. One Direct-Acting Niagara Steam Pump, 22-inch stroke. 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Trade Report.

Office of THE IRON AGE, |

WEDNESDAY EVENING, July 13, 1881.

The week in Wall street has been dull, and the sales made are generally at a decline. One week ago to-day there was a decided recovery from the first shock caused by the attempted assassination of the President, which was further strengthened on Thursday by favorable reports respecting his condition. The feature of the day was a steady rise in Union Pacific, Northwestern and Western Union. Previously there had been considerable shifting of loans, growing out of sudden changes in the stock market, but with the restoration of confidence capital was again freely offered. Government bonds were firm, and railroad bonds advanced on an increased business. On Friday the trunk line shares became decidedly weak, on reports of a renewal of the railroad war, both as to freights and passengers, which were subsequently confirmed, and their influence contributed to prostrate the entire list, the market closing weak. The principal exceptions were the Elevated Railroad stocks and Boston Air Line, the former attributable to the announcement that Messrs. Gould, Sage and Dillon had been elected directors of the Metropolitan Elevated Railroad Company. Monday was an "off" day in stocks, the decline in trunk line and elevated stocks unsettling the market, and the drooping tendency has not since been recovered from. On Tuesday the decline ranged from $\frac{1}{2}$ to $\frac{3}{4}\%$, due to reports of further cutting of rates by the trunk lines, and there was a sympathetic movement in London to a corresponding extent.

Government bonds were less active than usual and a fractional decline was recorded, which served to stimulate a demand for investment. Railroad and State bonds were less active, irregular and generally lower; transactions unimportant. Money is abundant, and the rate is $3\frac{1}{2}\%$ in general or mixed collateral; on Government bonds the rate is $2\frac{1}{2}$ or 3% for the remainder of the year. The posted rates for bankers' sterling remain unchanged at 4.84% for 60 days and 4.86% for eight.

The bank return for the week shows a loss of \$359,250 in surplus reserve, which now stands at \$6,452,050, against \$17,768,225 at this time last year, and \$10,941,200 at the corresponding period in 1879. The loans show a gain this week of \$2,365,700.

The importsations of specie and bullion at this port during the week ending July 8 were \$67,194, consisting of \$37,468 in gold and \$29,726 in silver, as against a total of \$49,111 for the week ending July 10 last year. The importsations since the 1st of January and since the 1st of August compare as follows with the movement during the corresponding periods last year:

	Since January 1	1881.	1880.
Gold	\$28,534,134	\$1,891,482	\$1,891,482
Silver	1,601,814	2,941,977	2,941,977
Total	\$29,835,948	\$4,82,759	\$4,82,759
	Since August 1	1879-80.	1879-80.
Gold	\$9,513,102	\$76,919,454	\$76,919,454
Silver	4,073,165	5,918,791	5,918,791
Total	\$100,586,267	\$82,838,245	\$82,838,245

As noted above, the stock market opened strong, but was irregular under disturbing influences, and closed at a decline through nearly the whole of the list, Western Union being one of the few exceptions. Comparing sales of stocks at the opening and at the close, the principal changes are as follows: Declined—New York Central, $3\frac{1}{2}\%$; Canada Southern, 3% ; New York, Lake Erie and Western, $2\frac{1}{2}\%$; New York, Lake Erie and Western preferred, $5\frac{1}{2}\%$; New Jersey Central, $2\frac{1}{2}\%$; Lake Erie and Western, 2; Lake Shore, 5; Cleveland, Columbus, Cincinnati and Indianapolis, 3; Rock Island, 2; Union Pacific, $1\frac{1}{2}\%$; Michigan Central, 3%; Ohio and Mississippi, $3\frac{1}{2}\%$; Texas Pacific, 3; New York, Ontario and Western, $2\frac{1}{2}\%$; Northern Pacific preferred, $3\frac{1}{2}\%$; Denver and Rio Grande, $3\frac{1}{2}\%$; Nashville, Chattanooga and St. Louis, 7.

To-day the feature of the stock market was the application for the appointment of a receiver for the Manhattan Elevated Railway, to be made at Kingston by Attorney-General Ward. This movement, it was said, was favored by both the New York Elevated and the Metropolitan Elevated. After some maneuvering, Judge Dillon was selected to act, in the event of Mr. Ward's application being granted.

The market for foreign exchange at the close was extremely dull at unchanged quotations:

Bid.	Asked	
U.S. 4½% 's 1891 registered	114½	
U.S. 4½% 's 1891 coupon	114½	
U.S. 4½% 's 1897 registered	110½	
U.S. 4½% 's 1897 coupon	110½	
U.S. Currency 68 1895	130	
U.S. Currency 68 1896	131	
U.S. Currency 68 1897	132	
U.S. Currency 68 1898	133	
U.S. Currency 68 1899	134	
"Fives" continued	105½	102½
"Fives" continued	100½	102½
Total	Changes.	
Loans	\$354,865,800	Inc. \$2,357,100
Specie	77,758,200	Inc. 1,318,000
Legal tenders	16,284,000	Dec. 888,000
Deposits	349,843,000	Inc. 3376,600
Circulation	19,140,000	Dec. 87,600

The following is an analysis of the bank totals of this week compared with that of last week:

Total	Changes.
Page in Catalogue.	Discount Per cent.
No. 435, Loose Nut Buttons.	70-80
30-35, Inside Shutter Hinges.	60
54, Barn Door Stay.	50
54, Barn Door Pulls.	65
77, Chain Bolts, Nos. 384, 382.	65
78, " Nos. 383, 384.	65
79, " Nos. 481, 482.	55
80, Bolts, change list of No. 400, 6 in., \$5.50.	60
81, Bolts, change list of No. 400, 6 in., \$5.50.	60
82-84, All Bolts.	60
85, Bolts, change list of No. 400, 6 in., \$5.50.	60
86-90, Barrel Bolts.	60
92, 93, Fancy Flush Bolts.	65
94, 95, " "	65
96, 97, Flush Bolts.	65
100, Ship Flush Bolts.	60
128-130, Cupboard Catches.	55
130-132, French Window Catches.	55
142-142B, Cupboard Turns.	60

MINING STOCKS.

The following were the closing quotations for Mining Stocks:

Bid.	Asked
Ame.	35
Alice	7.00
Alta Mont.	2.10
Bell Isle	25
Bechtel	1.75
Big Pittsburgh	2.30
Bonanza C.	20
Boston C.	18
Bulwer	3.00
Boulder C.	6.75
Calaveras	1.75
Cale B. H.	1.25
California	73
Climax	48
Consolidated Virginia	2.05
Consolidated Imperial	10
Consolidated Pacific	50
Crescent	5.25
Caribou	3.05
Dahlonga	5
Dunkin	60
Finley	25
Fa. De Smet	8.62½
Fast Eastern	24
Gold Stripe	2.55
Goodnow	30
Grovilla	5
Green Mountain	5.00
Hukill	5.75
Horn Silver	15.25
Hibernia	58
Hortense	33
Iron Silver	1.90
Lakeville	28
L. Chief	1.35
Mariposa	1.35
Mar. Pref.	2.75
Moore	4.00
Miner Boy	1.15
Navajo	65
San Pedro	45
S. L. No. 1	1.60
S. L. No. 4	.85
S. L. 1 and 4	1.05
S. L. 2 and 3	3.70
Tioga	55
Tucarora	24

All subject to per cent. extra for prompt cash.

We have received the following circulare:

[No. 28.]

GAYLORD MFG. CO., CHICAGO, MASS., July 5, 1881.

GENTLEMEN: Please take notice that the machinery, stock and business of this company are now being removed to Terryville, Conn., there to be consolidated with the Eagle Lock Co., who will hereafter execute all orders for this company's goods, either with "Gaylord" or "Eagle" labels and numbers, as customers may designate.

The office of this company will be continued here, and communications may be sent here or to Terryville and receive like attention.

We respectfully solicit a continuance of your orders, believing that the arrangements made will be advantageous to our customers, in securing to them the benefits of improved and increased facilities for the manufacture of our goods. Respectfully,

GAYLORD MFG. CO.

MILLERS FALLS, MASS., July 1, 1881.

To the Trade.—We take pleasure in announcing the establishment of a new concern at Millers Falls, Mass., for the manufacture, among other things, of a superior line of Housekeeping Hardware, Garden and Floral Tools, &c. The style of the firm will be the Lester & Lyman Manufacturing Company, and its location, general management and facilities for prompt production will enable customers to rely upon the most speedy and satisfactory execution of their orders. It will be the aim of its officers and projectors to make a strictly first-class line of goods, adapted to the wants of consumers who prefer a good article at a fair price to those which abound at bargain counters and auction rooms. We have made Messrs. Graham & Haines, 113 Chambers street, our general agents, who will, after August 1, keep a well-assorted stock of our wares to supply immediate wants. Hoping for a share of your patronage, and assuring you that no pains or expense will be spared to meet your demands, we are yours, respectfully,

LESTER & LYMAN MFG. CO.

GENERAL HARDWARE.

The demand for General Hardware continues fairly active, and the tone of the market is firm, with a tendency to higher prices in many lines of goods.

Nails are in better request this week, but values remain in the condition previously noticed, and we continue to quote rod to God., \$2.90 @ \$3 per keg, net, according to size of order. The Western Nail Manufacturer Association held a meeting in Pittsburg to-day, at which existing prices were re-armed.

The Old Colony Iron Company have issued the following circular, conforming their prices to those adopted by the Oliver Ames & Sons Corporation, which appeared in our issue of last week:

[Attach this to our Price List August 1, 1880.]

TAUNTON, MASS., July 1, 1881.

GENTLEMEN: We have reduced the prices of the following goods on our Price List of August 1, 1881:

	Per cent.
A. Cook Polished Solid Shovels.	.25
Richardson, " Spade.	.25
Climax, " Spades.	.50
C. Bruce, Blk. S. E. Spades.	.50
P. D. Pratt, Pol'd S. E. Shovels and Spades.	.50
A. Cook, Pol'd Solid Spovels.	.50
A. L. Reed, " Spoons.	.50
C. Miller, Iron " Scissors.	.50
Saunders, " Scissors.	.50
D. Pratt, " Scoop	.50
Stevens, " Spoons.	.50
C. P. Bruce, Blk. S. E. Shovels.	.50
E. Stanley, Pol'd Solid Shovel.	.75
E. Carr, Steel Scoop.	.75
F. Stanley, Pol'd Solid Spade.	1.00
O. Ward, Steel Scoop.	1.00

On and after this date we shall allow on all of our goods a discount of 15 per cent. from our price list. We also allow an extra discount of 7½ per cent. to all parties whose net purchases from us exceed \$500 in six months. Our terms are net cash, payable in Boston or New York funds, we reserving the privilege of drawing at sight, with exchange, for all bills not paid within 30 days. Interest from date at 7 per cent. will be charged on all invoices not paid promptly. We prepay the freight on our goods to Boston or New York, but all goods are at risk of purchaser after shipment from the factory. All orders will be filled at the prices ruling at the date of shipment. We have facilities for filling orders of any amount at short notice. All goods ordered will be shipped with dispatch. We would call your attention to our patent Solid Cast Steel Scoop, it being the only Scoop made without back and front strap riveted on the blade, and recommend it for many purposes superior to any Scoop manufactured.

Yours truly, OLD COLONY IRON CO.

Warehouse, No. 211 Pearl street, New York.

The manufacturers of Shelf Hardware, who have been competing with each other, have agreed upon prices of Bolts, Catches, Door Handles and similar goods. Owing to competition, these goods, the manufacturers claim, have been sold very close to cost, while the demand has been fully up to the production, and no stocks have accumulated. The new prices show an advance of about 10 per cent. upon former rates.

We print below the revised prices of Sargent & Co.'s goods, which will be presented in their discount sheet No. 3, under date of July 11, 1881, in a few days:

Discount	Per cent.

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IMPORTS

*# Hardware, Iron, Steel and Metals into
the Port of New York, for the Week ending
July 13, 1881:*

Hardware.	
Acosta R.	Mach'y, bx., 1
Ames Plow Co.	Cases, 2
Baldwin Bros & Co.	Pkg., 1
Baker H. & Co.	Mach'y, cs., 6
Boker H. & Co.	Cases, 2
Brown L. H. & Co.	Arms, cs., 10
Colwell Bros.	Gun materials, cs.,
Dodge Alfred.	Cutterly, cs., 5
Dunn John.	Hardware, cs., 4
Fiedl Alfred & Co.	Needles, cs., 1
Ferris Francis J.	Brick Co.
Folsom H. & D.	Ma-h'y, bxs., 2
Frass P. A. & Co.	Colwell Bros.
Garnett, J.	Mach'y, pkgs., 7
Godfrey E. J.	Williamson Jas. & Co.
Graef Cutlery Co.	Pig, tons, 300
Hartley & Graham.	Order,
Herrick Frost & Co.	Pig, tons, 903 ^{1/2}
Hirsch, J.	Blooms, 1093
Keller L. H. & Co.	Bars, 46 ^{1/2}
Kamak Cutlery Co.	Rails, old, tons, 100
Lape Thos.	Rails, new iron
Lapch'y, cs., 20	flange, 659
McIlhaney W. H.	Scrap, tons, 870
Moor's Sons, J. P.	Scrap, heavy wr'ght, lot
Moss F. W.	Manganese, cks., 50
Merchants' Dispatch Co.	Iron ore, kilos, 1,000
N. Y. Coal Tar Chem. Co.	Best Refined, 4 ^{1/2} @ 5 ^{1/2} advanced on the above.
Rosenfeld J.	Boiler Tubes, 10 ^{1/2} @ 47 ^{1/2} %, and Steam and Gas Pipe at 65 @ 67 ^{1/2} %, discount from list price.
Rogers H.	Sheet, pkgs., 250
Schuyler & Duane.	Wire rods, bds., 654
Schoverling, Daly & Gales.	Steel.
Scott W. P.	Abbott Jere & Co.
Arms, cs., 7	Cases, 39
Thebaud Bros.	Brown Bros. & Co.
Mach'y, cs., 1	Pkgs., 128
Tillotson & Co. L. G.	Steel wire rods, rings, 722
Cask, 1	Steel.
Windmuller & Roelker.	Steel bars, bds., 302
Arms, cs., 4	Drexel, Morgan & Co.
Witter & John G. & Bro.	Blooms, 82
Pig, 6	Ingot, 121 ^{1/2}
Jew's harps, cks., 5	Lake Shore & Mich. So.
Ward Asline.	Rails, 392
Pkgs., 3	McIlhaney W. H.
Wiebusch & Co.	Rails, 874
Ironware, cs., 5	Moss W. W.
Cutlery, pkgs., 37	Bundles, 82
Chain, bbls., 15	Crop ends, 10
Casks, 30	Crop ends, kilos, 32, 848
Order,	Steel.
Anvils, 68	Bundles, 10
Cases, 18	Crop ends, 20
Ironware, cs., 5	Steel rods, pkgs., 2164
Iron.	Steel rails, 1246
Bailey Lang W. H. & Co.	Bundles, 10
Bar, 40 ^{1/2}	Steel sheets, lots, 75,
Bundles, 30	Old rail'leat' spring
Strips, 30	kilos, 64, 63
Baring Bros. & Co.	Old railway leaf
Pig, tons, 170	spring, 10, 075
Clyde Wm. P. Co.	metals.
Iron buoy, 1	Baldwin Bros. & Co.
Coddington T. B. & Co.	Platinum, case, 1
Sheet iron, lbs., 134	Brown Bros. & Co.
Old iron, bds., 504	Tin slabs, 359
Drexel, Morgan & Co.	Coddington T. B. & Co.
Specular iron, tons, 150	Tin plates, bxs., 133
Specular iron, half-kilos, 305, 362	Darby & Co.
Ore, tons, 337	Old metal, cks., 2
Spiegel, kilos, 119.	Dickinson, Van Dusen & Co.
Elwell J. W. & Co.	Tin and terne plates, bxs., 1135
Iron, tons, 150	Elwell Jas. W. & Co.
Hurst F. W. J.	Brass, pkgs., 8
Pig iron, tons, 495	Hasby J. Moses & Co.
Irwin, Richard & Co.	Copper, pkgs., 10
Pig, tons, 200	May's Sons, J.
Pig iron, lots, 2	Zinc oxide, btl., 150
Lee Jas. & Co.	Mestre & Dents.
Pig, tons, 150	Yel. metal, cks., 4
Leavey & Co.	Myer, G. A. & E.
Old iron, lot	Zinc oxide, bbls., 20
Old iron, cks., 3	Paulson Wm.
The prices current for Rags, &c., are as follows:	Spelter, plates, 4968
Canvas, Linen,	Phelps & Fife & Co.
White Cotton, New,	Tin slabs, 1244
White, No. 1,	Tin plates, 2410
Seconds,	Lead, pugs, 2523
Soft Woollens,	Lead, pgs., 385
Mixed Rags,	
Gunny Bagging,	
Jute Bags,	
Knapsack Bagging,	
Poof Stock,	
Newspapers,	
Waste Paper and Scraps,	
Kentucky Bale Rope,	

COAL.

A fair business is doing in Coal circles, although it is confessedly dull, in accordance with former experience at this season of the year. The best authorities agree that nothing has been decided upon by the companies in regard to a further suspension at the close of this month, nor as to the talked-of advance of prices in August. There being at present no restriction whatever, all are at work on full time, and we judge from current surmises in the trade, are likely to continue so. At the Lehigh Valley office trade is reported to be moving along nicely. In fact, the first-class hard Coals seem to have had the cream of the business all along. Respecting further movements, it is intimated in the same quarter that the companies will be governed altogether by their necessities later on. As nearly as can be understood by outsiders, two or three recognized leaders confer informally, when so disposed, concerning situations, and the conclusions reached by them are sufficient to govern all in the common interest. Quotations for Anthracite are unchanged, viz.: Lehigh, \$4.40 @ \$5.25 for Lump; \$4.25 @ \$4.45 for Grade, Egg and Stove; \$3.90 @ \$4 for Chestnut. Lackawanna and other Wyoming Coals are \$3.90 for Lump, and smaller sizes in proportion.

Bituminous Coals continue dull, with a tendency to an overstock. The companies are getting \$3.25 at Georgetown, \$3.50 at Baltimore and \$4.75 @ \$4.90 at New York—at least this is what they affirm. The Western demand for Coal continues to increase, so that the Pennsylvania Coal Company is expecting that this year's business in this direction will double last year's.

Freights are without change, the rate to Boston being \$1.25 @ \$1.30, and vessels are still difficult to be had.

The total tonnage of Anthracite Coal from all the regions for the week ending July 2, as reported by the several carrying companies, amounted to 671,910 tons, against 404,211 tons in the corresponding week last year. The total amount of Anthracite mined for the year is 12,665,564 tons, against 10,383,511 tons for the same period last year. The quantity of Bituminous Coal sent to market last week amounted to 101,652 tons, against 90,147 tons in corresponding week last year.

The Pottsville Miners' Journal says the trade has been tenderly nursed by the several interests controlling the production since March last, and it is believed by those best posted in the trade that it is now nearly in a condition to take care of itself.

PHILADELPHIA.

Office of The Iron Age, 220 South Fourth St., PHILADELPHIA, July 12, 1881.

Pig Iron.—The market shows but little change, and, although holders are firm, there is no great activity to report. A few good-sized transactions have taken place, however, and sellers claim that prices are more in their favor than could have been realized at any time during last month. The general feeling is undoubtedly one of confidence, and the indications favor better prices with the opening of the fall trade. The suspension of work at the mills last week, which will be further extended during the second week in the month, may check the demand for Pig Iron to some extent, but with the constant and heavy demand for Finished Iron the delay can only be temporary. In some quarters we bear expressions of disappointment that buyers are not coming in as freely as was expected, and in cases where there is urgency to realize, prices are shaded so as to induce business. Standard brands are firmly held, however, and it is only in outside lots that there is any irregularity. Foundry Irons show less firmness than other descriptions, although good brands are by no means weak. Mill Irons are strong, and anything of desirable quality seems to be sure of a market at \$20 @ \$22 for Gray Forge. The leading producers of Mill Irons are well sold up, and appear to be under no necessity to urge sales. The outlook, as a whole, may be regarded as eminently satisfactory, although, for reasons mentioned, quotations are somewhat irregular. Consumption is likely to be fully maintained, while stocks in yards are in small compass, and the furnace output something less than during the early part of the year. The trade at large take a cheerful view of the position, although in no sense of the word is there any disposition to speculate. Prices are believed to be safe, and for such brands as they approve consumers take all they require without fear of a decline. Brands that are unknown require a good deal of pushing, however, and the low figures quoted apply to this class only. Choice No. 1 Foundry may be quoted \$25 @ \$26 for small lots. Lehigh brands command \$24 @ \$24.50, and a few outside brands are said to be available at \$23.50, and possibly less for prompt cash. No. 2 Foundry sells at \$21 @ \$22. Ordinary brands of Gray Forge may be had at \$20 @ \$20.50, but the best are firmly held at about \$22. Charcoal Iron sells at \$32 @ \$37, according to brand, and is in fair demand.

Foreign Iron.—Bessemer Iron is firmer, and a sale of 1500 tons was made last week at \$23.50. It is reported that a 10,000-ton lot was sold to day at a slight advance on that figure, but we have not been able to verify it. There is a much better feeling, however, and prices may be considered at least a dollar to a dollar and a half higher than during last month. Middlesboro' Iron is steady, but there is not much demand. Sales in every instance have to be crowded, and under such circumstances it is a difficult matter to obtain satisfactory prices. We hear of a sale of No. 4 at about \$16.50 for several hundred tons, with No. 3 offered at \$17.50 in store, although others are asking \$18 @ \$18.50. Scotch Iron is dull and entirely nominal, at \$21 for Eglington and \$23 @ \$24 for Coltness and Gartsherrie.

Blooms.—The demand is fair, and desirable lots are readily taken at late quotations, viz.: \$62.50 @ \$65 for Cold-blast Charcoal; \$55 for Run-out Anthracite, and \$45 @ \$47.50 for Scrap Blooms.

Muck Bars.—A fair business is doing, but prices show no change. Sales are reported at \$38 @ \$38.50 at mill, the outside price obtainable for small lots only.

Bar Iron.—An average of 10 days' suspension of work at the city mills has caused a little scarcity, and orders are crowded in with some urgency. Stocks appear to be low both with consumers and dealers, and considerable activity is anticipated during the next three months. In fact, it may be said that without any excitement in prices, there probably never was a time when it was so difficult to place orders as it is to-day. The mills are uncomfortably full of work, while the excessive heat has made it impossible to turn out their usual proportion. The consequence is that parties have to wait for deliveries, and, from present indications, this condition of affairs will continue for some time. Prices are steady at 2.4¢, and it is quite exceptional to hear of an order being taken at a lower rate.

Structural Iron.—The same remarks apply to all descriptions of shapes, which are in most urgent demand. A good many orders have been declined, because of the impossibility of filling them promptly, and the outlook indicates continued activity, probably for months to come. Prices are firm and unchanged: Angles, 2.6¢; Tees, 3.1¢; Beams, 3.3¢; and Channels, 3.4¢.

Plate and Tank Irons.—The mills are nearly all full, and except for lots of 50 to 100 tons it is difficult to get an order accepted. Besides a heavy local demand, there has been an inquiry for 2000 tons boat plate for Detroit, but no one cared to bid on it, except for small lots to be delivered in the late summer. We continue our former quotations, at which an order can be placed (if placed at all), although some who are full ask higher prices: Tank Iron, 2.75¢; Refined Iron, 3.25¢; Shell, 3.50¢; Flange, 4.50¢, and Fire-box, 5.50¢ @ 5.75¢.

Wrought Iron Pipe.—The demand is very heavy, but prices show no improvement. Boiler Tubes are quoted at 45 @ 47^{1/2} %, and Steam and Gas Pipe at 65 @ 67^{1/2} %, discount from list price.

Sheet Iron.—Manufacturers report the demand as something extraordinary and entirely beyond their present capacity to meet, although they have been running full for months past. Prices are a shade higher and may be quoted as follows:

Common Sheet, No. 26 to 28	..... 4.1¢
Common Sheet, No. 22 to 25	..... 4.0¢
Common Sheet, No. 16 to 21	..... 3.9¢
Best Refined, 4¢ @ 5¢ advanced on the above.	..... 4¢
Best Plate Sheet, No. 26 to 28	..... 4.5¢
Best Bloom Sheets, No. 22 to 25	..... 6.4¢
Common Red Plates, 3-16 to 16	..... 3.2¢
Blue Annealed, 3-16 to 16	..... 3.4¢
Blue Bloom Galvanized, discount	..... 4.0¢
Second quality, discount	..... 50 %

Steel Rails.—There is rather more inquiry for distant deliveries, and it is believed that upward of 250,000 tons have already been taken for next year's delivery. For 1881 leading buyers completed their arrangements some time ago, upon which contracts the mills are now pushed to make deliveries. A few small orders are taken occasionally at about \$60, but they are regarded as a favor to the buyer more than as an ordinary business transaction. The same remarks apply to foreign Rails, early deliveries being difficult to secure, and most of the business being for winter or spring of 1882. It is said that about \$55 has been paid for the greater portion of the business entered for next year's delivery, and manufacturers appear to be firm, believing that they can secure full employment without making any further reduction. Several leading roads have already arranged for a portion of their requirements for 1882, and a large amount of additional business will no doubt be placed within the next 60 to 90 days. On the whole, the tone of the market is one of strength and firmness, and for the time being, at any rate, \$55 @ \$60, according to date for delivery, may be considered as fair average prices.

Steel Blooms.—There has been some inquiry, but it is difficult to trace actual sales. Two lots of 3000 tons each are said to have been taken at a price equal to about \$3.50 duty paid. They are offered at £6.50 @ 2.6¢, 7/6 c. i. f., with buyers at \$42.50, or 2.35¢ off for rolled and sheared. But few of the Tank mills are able to take orders at any price for immediate delivery, and a buyer from Ohio reports that he was unable to find any mill willing to take an order for Boiler Plate.

Steel.—Nothing worthy of notice has transpired during the past week, prices generally remaining firm, and the demand fair. We quote: Tool, 11 1/2¢; Machinery, O. H., 5 1/2¢; Crucible Machinery, 7¢; Hammer, 2 inches and under, 8¢; over 2 inches, 9¢; Cast Spring, 6 1/2¢; and O. H. Spring, Tire and Sleigh Shoe, 5¢. The quotations on this latter class of Steel would be shaded by annoyance to those of our manufacturers who are pressed with orders, it will, at the same time, enable them to realize remunerative prices, by preventing an accumulation of stock. As compared with the lowest point, there has been an advance of from three to six-tenths, and there is no difficulty in obtaining the advance. Bars are quoted at 2.25¢ @ 2.30¢ rates, 60 days, 2% off for cash; Sheet on a basis of 3.90¢ @ 4.5¢ for No. 24; Tank, 3.20¢ @ 3.25¢; Skelp, 2.25¢ @ 2.35¢ for rolled and sheared. But few of the Tank mills are able to take orders at any price for immediate delivery, and a buyer from Ohio reports that he was unable to find any mill willing to take an order for Boiler Plate.

Nails.—While there is no particular activity, the demand is increasing, and makers are all very confident of an active fall trade. Prices firm, but unchanged: Carload lots and upward, \$2.75, 60 days, 2% off for cash.

Wrought Iron Pipe.—The demand continues active, mills are busy and prices are firm, but unchanged; discount on Gas and Steam Pipe, 67 1/2 % @ 70%; on Boiler Tubes, 45 @ 47 1/2 %. Oil-well Casing, unchanged at 70¢ per foot, and Tubing, 20¢ per foot. The demand for all kinds of Oil-well supplies is restricted, in consequence of the continued unremunerative condition of the oil market.

Railway Supplies.—At no time perhaps for years has there been such an inquiry for Cast Iron Pipe; it is the same here as at Philadelphia. The Pipe founders are all so full of orders that it is difficult to place an order for near-by delivery at all. Some of them have contracts sufficient to absorb their entire production during the remainder of the present year.

Railway Supplies.—For near-by delivery Steel Rails are still quoted at \$63 @ \$64, cash, delivered at mill, but for delivery next year can be bought for considerably less, say \$57 @ \$58. Railway Spikes remain unchanged at 2.75¢ @ 30 days; Spike Bars, 2.45¢ @ 2.50¢; Track Bolts

IMPORTS

*A Hardware, Iron, Steel and Metals into
the Port of New York, for the Week ending
July 13, 1881:*

Hardware.

Acosta R.
Mach'y. bx., 1
Ames Plow Co.
Cases, 2
Pkg., 1
Baldwin Bros & Co.
Machine, cs., 6
Boker H. & Co.
Cans, 2
Arms, 10
Gun materials, cs., 3
Cutlery, cs., 5
Hardware, cs., 4
Needles, cs., 1
Brooks & Co.
Ma h'y. bts., 2
Colver Bros.
Mac'pkgs., 24
Dodge Alfred,
Cases, 7
Dunn John,
Cases, 2
Field Alfred & Co.
Cases, 15
Ferris Francis J.
Cases
Folsom H. & D.
Arms, cs., 2
Cases, 8
Frass P. A. & Co.
Files, cks., 3
Garner & Co.
Mach'y. cs., 3
Godfrey E. J.
Cases, 3
Graef Cutlery Co.
Cases, 12
Hartley & Graham,
Arms, cs., 12
Herman, Frost & Co.
Balances, cs., 4
Keller L. H. & Co.
Cases
Kamak Cutlery Co.
Cases, 3
Lape Thos.
Mach'y. cs., 20
Moore's Sons, J. P.
Arms, cs., 24
Moss F. W.
Files, cks., 8
Mercury Dispatch Co.
Cask,
N. Y. Coal Tar Chem.
Co.
Mach'y. cs., 1
Rosenthal J.
Pkg., 4
Rogers H.
Cases
Schuyler & Duane,
Cases, 2
Schoweling, Daly &
Gales,
Arms, cs., 7
Scott W. P.
Arms, cs., 9
The Bros.
Mach'y. cs., 1
Tillotson & Co. L. G.
Cask,
Windmuller & Roelker,
Arms, cs., 4
Witte John G. & Bro.
Pkg., 6
Hurst P.
Jews harps, cks., 5
Ward Allen,
Pigs, 3
Weibusch, Hilger & Co.
Ironware, cs., 5
Cutlery, pkgs., 15
Chain, bbls., 15
Casks, 39
Order,
Anvils, 68
Cases, 18
Ironware, cs., 5

Steel.

Abbott Jere & Co.
Cases, 39
Brown Bros. & Co.
Pkg., 129
Steel wire rods,
rings, 722
Carey & Moen,
Steel rods, bbls., 301
Drexel, Morgan & Co.
Cases, 29
Lake Shore & Mich. So.
Rails, 32
McIlhenny W. H.
Rails, 374
Moss F. W.
Bundles, 82
Bars, 13
Cases, 16
N. Y. Central R. R.
Rails, 791
Order,
Blooms, 5597
Steel mill crop ends,
tons, 32
Crop ends, lot
Crop ends, kilos,
32,848
Steelware, cs., 20
Steel rods, pgs., 214
Steel rails, 1046
Steel rods, tons, 1631
Steel sheets, lots, 75,
kilos, 64,612
Old railway leaf
springs, 10,075
etc.
Baldwin Bros. & Co.
Platinum, case, 1
Brown Bros. & Co.
Tin slabs, 359
Coddington T. B. & Co.
Tin plates, bxs., 133
Darrell & Co.
Old metal, cks., 2
Dickinson, Van Dusen &
Co.
Tin and terne plates,
No. 1, 12c.
Elwell Jas. W. & Co.
Brass, pkgs., 8
Haasly J. Moses, 4968
Copper, pgs., 10
Macy's Sons J.
Zinc oxide, bbls., 150
Meurer & Dentz,
Yard metal, tons, 4
Myer, G. A. & E. A.
Zinc oxide, bbls., 200
Paulson Wm.
Sphalerite, plates, 4968
Phelps Dodge & Co.
Tin slabs, 124
Tin plates, 2410
Black tag, 117
Order,
Tin plates, bxs., 3420
Tin and terne plates,
2015
Tin sheets, bxs., 14
Tin slabs, 2173
Ingots, 2329
Lead, pigs, 2523
Lead, pgs., 385
Lead, pgs., 385

OLD METALS, PAPER STOCK, &c.

The purchasing prices offered by dealers are as follows:

Copper, heavy	W. M. \$0.14	@ \$0.15
Copper bottoms	" .12	.09
Yellow Metal	" .08 1/2	.08
Brass, heavy	" .11 1/2	.12
Brass, light	" .08 1/2	.09
Composition, heavy	" .12 1/2	.13 1/2
Lead, heavy	" .03 1/2	.04
Lead, light	" .03 1/2	.04
Pewter, No. 1	" .03 1/2	.03 1/2
Pewter, No. 2	" .03	.03
Wrought Iron	W. ton 22.00	@ 22.00
Light do.	" 10.50	@ 11.00
Stove Plate	" 11.00	@ 12.00
Machinery do.	" 15.00	@ 16.00
Grate Bars	" 5.00	@ 6.00

The prices current for Rags, &c., are as follows:

Canvas, Linen	W. M. 3 1/4 c.	@ 4 c.
White Cotton, New	" 3 1/4 c.	@ 4 c.
" No. 2	" 2 1/2 c.	@ 3 c.
White, No. 1	" 4 1/2 c.	@ 4 1/2 c.
Secondo	" 2 1/2 c.	@ 3 c.
Soft Woollens	" 8 1/2 c.	@ 9 1/2 c.
Mixed Bargs.	" 2 c.	@ 2 1/2 c.
Gunny Bagging	" 1 1/2 c.	@ 2 c.
Jute Butts	" 2 c.	@ 2 1/2 c.
Kentucky Bagging	" 3 1/2 c.	@ 4 c.
Book Stock	" 2 1/2 c.	@ 3 1/2 c.
Newspapers	" 1 1/2 c.	@ 2 c.
Waste Paper and Scraps	" 1 1/2 c.	@ 2 c.
Kentucky Bale Rope	" 4 c.	@ 5 c.

COAL.

A fair business is doing in Coal circles, although it is confessedly dull, in accordance with former experience at this season of the year. The best authorities agree that nothing has been decided upon by the companies in regard to a further suspension at the close of this month, nor as to the talked-of advance of prices in August. There being at present no restriction whatever, all are at work on full time, and we judge from current surmises in the trade, are likely to continue so. At the Lehigh Valley office trade is reported to be moving along nicely. In fact, the first-class hard Coals seem to have had the cream of the business all along. Respecting further movements, it is intimated in the same quarter that the companies will be governed altogether by their necessities later on.

As nearly as can be understood by outsiders, two or three recognized leaders confer informally, when so disposed, concerning situations, and the conclusions reached by them are sufficient to govern all in the common interest. Quotations for Anthracite are unchanged, viz.: Lehigh, \$4.40 @ \$2.25 for Lump; \$4.25 @ \$4.45 for Grate, Egg and Stove; \$3.90 @ \$4 for Chestnut. Lackawanna and other Wyoming Coals are \$3.70 for Lump, and smaller sizes in proportion.

Bituminous Coals continue dull, with a tendency to an overstock. The companies are getting \$3.25 at Georgetown, \$3.50 at Baltimore and \$4.75 @ \$4.00 at New York—at least this is what they affirm. The Western demand for Coal continues to increase, so that the Pennsylvania Coal Company is expecting that this year's business in this direction will double last year's.

Freights are without change, the rate to Boston being \$1.25 @ \$1.30, and vessels are still difficult to have.

The total tonnage of Anthracite Coal from all the regions for the week ending July 2, as reported by the several carrying companies, amounted to 671,919 tons, against 404,211 tons in the corresponding week last year. The total amount of Anthracite mined for the year is 12,669,564 tons, against 10,333,311 tons for the same period last year. The quantity of Bituminous Coal sent to market last week amounted to 101,652 tons, against 90,147 tons in corresponding week last year.

The Pottsville *Miners' Journal* says the trade has been tenderly nursed by the several interests controlling the production since March last, and it is believed by those best posted in the trade that it is now nearly in a condition to take care of itself.

PHILADELPHIA.

Office of *The Iron Age*, 220 South Fourth St., Philadelphia, July 12, 1881.

Pig Iron.—The market shows but little change, and, although holders are firm, there is no great activity to report. A few good-sized transactions have taken place, however, and sellers claim that prices are more in their favor than could have been realized at any time during last month. The general feeling is undoubtedly one of confidence, and the indications favor better prices with the opening of the fall trade. The suspension of work at the mills last week, which will be further extended during the second week in the month, may check the demand for Pig Iron to some extent, but with the constant and heavy demand for Finished Iron the delay can only be temporary. In some quarters we bear expressions of disappointment that buyers are not coming in as freely as was expected, and in cases where there is urgency to realize, prices are shaded so as to induce business. Standard brands are firmly held, however, and it is only in outside lots that there is any irregularity. Foundry Irons show less firmness than other descriptions, although good brands are by no means weak. Mill Irons are strong, and anything of desirable quality seems to be sure of a market at \$20 @ \$22 for Gray Forge. The leading producers of Mill Irons are well sold up, and appear to be under no necessity to urge sales. The outlook, as a whole, may be regarded as eminently satisfactory, although, for reasons mentioned, there is no great activity to report. A few good-sized transactions have taken place, however, and sellers claim that prices are more in their favor than could have been realized at any time during last month. The general feeling is undoubtedly one of confidence, and the indications favor better prices with the opening of the fall trade. 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strength of the current and the proportion of copper to the tartaric acid, the iridescences may be produced of different shades and tints, which may be varied or intermingled by shielding certain parts of the object by an impermeable coating of paraffine or varnish, while the iridescent effect is being produced on the parts left exposed. All colors, from that of brass to bronze, scarlet, blue and green may thus be produced at will.

What Carelessness Costs.

The report of the New York Board of Fire Commissioners for 1880 is just issued, and although not quite as exciting or romantic as the average novel, the record is one that Charles Lamb would characterize as being full of fire from beginning to end. With the departmental details which make up most of the material of the report we do not now purpose to concern ourselves. But there is one feature of the document which deserves special attention, and this is the tabulated experience of the city of New York in the matter of fires since 1866, together with a careful compilation of the causes of these fires since 1868, so far as it was possible to ascertain them. These statistics of the number, causes and effects of our local fires during this long period make up a record of costly carelessness which ought to be emphatic in suggesting the inquiry whether this sort of thing must be hopelessly accepted as beyond remedy or reform.

Among the many causes of fires in this city from June 1, 1868, to January 1, 1881, the following are those which appear to have been most active, frequent and numerous. We give the aggregate number of fires traced to the causes named during the period mentioned above:

Accidental, or not ascertained.....	346
Carelessness of occupants with matches, lights, cigars, hot ashes, &c.	4,689
Children playing with matches, &c.	837
Defective flues, furnaces, &c.	295
Defective arrangement of stoves, &c.	345
Escaped gas igniting	345
Fat, varnish, &c., boiling over	323
Foul chimneys	1,729
Fires in steam-boilers	487
Heat from grates, steam-pipes, &c.	340
Hot coals from stoves and grates	134
Incidinary, or supposed incendiariness	214
Kerosene oil lamps falling	1,267
Malicious mischief	216
Not ascertained.....	265
Overheated stoves, pipes, &c.	868
Sparks from chimneys, engines, &c.	900
Spontaneous combustion	457
Vapor of naptha, gasoline, &c.	88
Window curtains, &c., fired by gas jets	907

During the period covered by the above enumeration, there have been about 17,500 fires in this city. Of these 17,500 fires, nearly 90 per cent., or 15,316, are accounted for under the 19 causes above mentioned; less than 5 per cent. (865) are classed as "not ascertained," and the remaining 1,319 fires are chargeable upon some eighty varieties of origin. It is noteworthy, therefore, that if we leave out "incendiariness" and "malicious mischief," there is scarcely a cause given for all these fires which might not properly be specified as carelessness, pure and simple, either on the part of the owner or occupant, or else of some equally careless outsider.

In point of fact, it is difficult to assign the great bulk of these fires to anything else than carelessness or the lack of due precaution; for even the entire century of causes so laboriously specified in the tables brings us back to the point that, with a reasonable degree of vigilance on somebody's part, nine-tenths of all these fires might have been easily prevented, at a saving of \$45,000,000.

The trouble is that New York is not at all a singular sinner in this respect. Just this same recklessness characterizes our people wherever located. And if the statistics were gathered in the several States, as they should be, but are not (with the exception of Massachusetts), we would easily see how nine-tenths of all the causes of American fires resolve themselves into the one controlling cause—carelessness. Construction is faulty; but so much the more reason why extraordinary precautions and vigilance should be exercised. And so on through the list of reasons that may be given why we have so many fires. The reasons are intelligible enough and plentiful enough; but then they are only so much the more reason why everybody should be on guard personally or by deputy, first to prevent fires and next to put them out at the start. But because we will not invest time, trouble or thought in this matter of precaution, the country must trade off \$100,000,000 worth of good property every year for a worthless heap of ashes and pay some \$30,000,000 a year for fire departments and their incidentals—to say nothing of the \$25,000,000 also expended annually on the underwriting machinery whereby indemnity is provided for the provident policy-holder. Thus carelessness becomes a costly national habit which, as much as any other, tends in a ruinous direction.

The Substitution of Steel for Iron and Iron for Wood in Car Construction.

The following is the report on this subject presented at the recent convention of the Master Car Builders' Association:

To the President and Members of the Master Car Builders' Association.—GENTLEMEN: Your Committee on the "Substitution of Steel for Iron and Iron for Wood in Car Construction" present the following report:

Although the past year has been one of great activity in car construction, we are not able to report rapid progress in the substitution of iron for wood or steel for iron in the building of cars. The overwhelming desire for "cheap cars" seems to blind the eyes of the railway officials to the fact that the sudden increase of load in freight cars from 10 to 20 tons has changed many of the conditions of freight transportation. The car that did very well to carry 10 tons (the load for which they were planned) prove unable to carry 20 tons, and are being rapidly crushed out of existence. Wood that served well the purpose with 10 tons of load is insufficient to bear the hammering of 20 tons.

The problem is forced upon us whether we will or not; we must consider the question of this substitution and that very speedily.

There is another item in this question important to consider, and that is the rapid stripping off the timber supply of all kinds. Experts tell us that the consumption of American timber in 1880 amounted to 20,000,000,000 feet. The vastness of this quantity the broadest mind cannot at all comprehend. When the yearly consumption was one-tenth of what it now is, our fathers feared a famine of wood. In the face of these alarming facts can we afford to shut our eyes and drift along?

Mr. Coleman Sellers is reported by the Philadelphia Times as saying: I see that some one has introduced an ordinance in Councils forbidding the use of cast-iron boilers. I wish to rub in the fact that that is sheer nonsense. Cast iron is just as good as any other iron in boilers. Some of the highest authorities say that it is better than any other kind. It all depends on how you use it. We have a cast-iron boiler that we use for testing injectors, because it will stand a higher pressure than a wrought-iron boiler. If you subject a cast-iron boiler-head to the same annealing process that a car wheel goes through, it will not explode. Take a car wheel out of the mold and lay it on wet sand and it will crack. Let it cool off in

upper Mississippi with the proposed Lake Mackenzie could be easily made. The outflow from such a lake, having a length of more than 2000 miles from south to north, and draining a very wide range of altitudes and latitudes, would be a timely and enduring one. This lake would make possible and easy the straightening of the lower Mississippi. It would also contribute to the proposed ship channel from Cairo, Ill., to the Gulf of St. Lawrence, by the almost straight line which cuts the Wabash Valley, the lakes Erie and Ontario and the lower St. Lawrence.

Arizona Copper Mines.

A correspondent of the San Francisco Bulletin, writing recently from Tucson, says: The copper interests of the Territory are attracting great attention at present, and good copper mines and prospects are eagerly sought after by our resident capitalists, as well as by strangers in our gates.

The famous Copper Queen mine, of Bisbee, the representative copper mine in the territory, which bears the same relation to copper mines that the Contention mine of Tombstone bears to the silver mines, has paid its fortunate owners, Messrs. W. H. Martin & Co., of San Francisco, the well-known sea-wall contractors, the handsome dividend of \$100,000 per month for the past four months. A recent careful examination of the mine, made by John R. James, of Tucson, a recognized authority on copper, shows that \$1,925,000 are in sight, estimating copper at 19 cents per pound. The original cost of this mine was \$30,000. A furnace was erected at a cost of \$11,000, making the total cost of mine and plant fall inside of \$50,000. The success of the Copper Queen has stimulated the development of copper properties in other sections of the territory, and scarcely a day passes without reports of new strikes and big finds of this most valuable metal. The latest transfer of copper properties was made recently to Mr. Christopher and other California capitalists, by O. A. Hyatt and others, of the Apache, Midas, and St. Nicholas mines, lying on the easterly slope of the Santa Catalina Mountains, and situated about 55 miles from Tucson. The mines have an elevation of about 7500 feet, and the vein lies between limestone and porphyry, the limestone being the overlying formation. The ores are found in the shape of carbonates and sulphurites, the carbonates predominating. The average assays show 30 per cent. in copper and \$20 in silver per ton. On the Apache location a cross-cut has now penetrated the vein for 15 feet in one of the above description, and the hanging wall of the vein has not yet been encountered. The ledge has been uncovered on the surface for 60 feet, and has been traced the whole length of the claim, 1500 feet. Some specimens of copper ore taken from the cut assay as high as 70 per cent. The Midas and St. Nicholas claims are extensions of the Apache, and show the same characteristics. Charcoal is abundant, and can be furnished for 15 cents per bushel. Water rights have been secured, and the cost of smelting should not exceed \$10 per ton. As 30 per cent. copper ore is worth \$60 per ton, there is a large margin of profit in smelting the ores on the ground. Yellow pine abounds, and this variety of timber makes the best charcoal known to the smelter. The climate is good all the year round. A good road can be constructed from the railroad track to the mines at an expense not to exceed \$3000. The free-smelting, and the low cost of labor seems to be no reason why the success of Bisbee should not be repeated at an early day in the Santa Catalinas.

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The problem is forced upon us whether we will or not; we must consider the question of this substitution and that very speedily.

There is another item in this question important to consider, and that is the rapid stripping off the timber supply of all kinds. Experts tell us that the consumption of American timber in 1880 amounted to 20,000,000,000 feet. The vastness of this quantity the broadest mind cannot at all comprehend. When the yearly consumption was one-tenth of what it now is, our fathers feared a famine of wood. In the face of these alarming facts can we afford to shut our eyes and drift along?

Mr. Coleman Sellers is reported by the Philadelphia Times as saying: I see that some one has introduced an ordinance in Councils forbidding the use of cast-iron boilers. I wish to rub in the fact that that is sheer nonsense. Cast iron is just as good as any other iron in boilers. Some of the highest authorities say that it is better than any other kind. It all depends on how you use it. We have a cast-iron boiler that we use for testing injectors, because it will stand a higher pressure than a wrought-iron boiler. If you subject a cast-iron boiler-head to the same annealing process that a car wheel goes through, it will not explode. Take a car wheel out of the mold and lay it on wet sand and it will crack. Let it cool off in

New forms are being thought out and tested, and in the end it may be found well that the process of substitution was not more rapid than it has been. We learn of some extensive preparations for building car trucks and beds almost entirely of iron, and are another convention assemblies we may see important progress in this direction.

The high-priced ideas of steel manufacturers are interfering materially with steel taking the place of iron in car construction. We regret this, as we are persuaded in many things a saving of weight might be effected without lessening the strength did not high prices bar the way. We would respectfully request our steel manufacturers to consider this matter and help us with low-priced mild steel for car work, and thus open up a large demand for steel where it is not used.

W. R. DAVENPORT,
JOHN KIRBY.

Supremacy in Manufactures.

The Philadelphia North American says: Although the United States census returns of manufacturing industry have long been completed and published as regards the city of Philadelphia, those of New York city are still imperfect. But on the strength of estimates that the annual production of the latter in 1880 was about so much, the assumption is made that New York is supreme in manufactures, as she undoubtedly is in domestic trade, foreign commerce, finance, exchanges and wealth. Of course it would not be extraordinary if this were true, since in all civilized nations the leading city is always a powerful emporium of domestic manufactures, because it affords the largest and best market. But in the case of New York the trading interests have been so conspicuously and overwhelmingly foreign, as to excite a natural curiosity to know by what process domestic manufactures became so strong there. No doubt the very fact of New York being so noisy and troublesome on the subject of protection, must have incited the domestic interests to endeavor to control that great market by centralization of capital and by organized effort, precisely as similar competition was successful in the principal cities of the West and South. New York also offered many advantages in the enormous supplies of labor, capital and raw materials. Yet these were counterbalanced by the exaggerated cost of living, rents, salaries, labor, &c., and thus manufacturers flourished for a long time all over New England, New York State, New Jersey and Pennsylvania better than in New York city. It is only since 1860 that industrial operations have been potential in the Empire city. In that period Philadelphia assumed and held the championship of domestic interests, and succeeded in nationalizing and giving permanence to industrial ambition. The immense internal development of the Republic naturally turned inward the superabundant activity and enterprise of New York, so that if we include all the outlying suburbs of that city the aggregation of manufacturing industry in and around that center is really vast and wonderful. But for this consummation we take to ourselves in Philadelphia a very considerable share of the influence that has led to such grand results, for there has been a city able at all times to challenge comparison with New York, built up almost entirely by domestic manufacturers, and ~~prospering~~ but a limited share of the foreign commerce of the republic, and a city, too, which in contrast with New York has for half a century provided better dwelling places for the inhabitants, and which occupies a decidedly higher position in the scale of average diffusion of the blessings of civilization among the masses of her people. As to the point whether New York is really ahead of Philadelphia in productive industry, we do not consider it worthy of discussion, since we cheerfully admit that the outlying suburbs of New York are so vast and wonderful in their development that their industry, added to that of New York, would at the present time overshadow that of Philadelphia. Yet still we do not surrender our claims to the leadership of manufacturing industry; for however great that interest may be in New York, it has manifestly failed to give color to the sentiment of the community, and is there regarded as a minor interest in view of the magnitude of the foreign commerce, while in Philadelphia productive industry overshadows everything else.

Steel Plates in Russia.—According to the regulations now in force at the Russian government yards, the steel plates there used for shipbuilding or boiler-making purposes are to be rolled from ingots containing from 0.18 to 0.22 per cent. of carbon, and in the case of the plates for boiler-making, the test samples have to stand a tensile strain of not less than 26 or more than 30 tons per square inch, and must elongate 20 per cent. in a length of 8 inches before fracture. Shipbuilding plates must have a breaking strain of between 26 and 31 tons per square inch, and must elongate not less than 17 per cent. in a length of 8 inches. The hot and cold bending tests are the same as those of the English Admiralty for iron, but in the case of the cold bending tests the samples are to be placed for 20 to 30 minutes in a cooling mixture, giving a temperature of about zero Fahrenheit, and after this they must bend to the same angle as is required for iron at the ordinary temperature.

the open air and it will break easily; but put it in an oven and keep it red hot for two or three days, and let it cool gradually, it is almost unbreakable. The same is true of boiler-heads.

METALLURGICAL NOTES.

ON MANGANESE IN STEEL.

Mr. Sergius Kern, of St. Petersburg, has contributed the following to Chemical News: Many works using inferior materials for the production of cast steel, either by the Bessemer or open-hearth processes, add a notable quantity of spiegeleisen, or ferromanganese; in steel cast by such works, some 0.60 to 1.00 per cent. of manganese is often detected. Certainly, such a steel is good for many purposes, but in some cases (as for the preparation of plates for boiler-making and shipbuilding) it is a serious question whether it is proper to use such a material, the corrosive property of which is very high and bending test bad. The author believes that inspectors, before passing plates for the above-mentioned purposes, should be instructed to make acquaintance with the chemical composition of the steel; by such means much confusion may be avoided. Some Bessemer steel-plates for boilers, on being analyzed, gave the following results:

Per cent.	
Carbon	0.18
Manganese	0.65

The ingots for the manufacture of these plates rolled capitally, and stood a higher test than Siemens-Martin ingots containing:

Per cent.

Carbon	0.18
Manganese	0.24

But in respect to the bending tests, these Bessemer and Siemens-Martin plates behaved quite differently, plainly showing the hardening effects of manganese:

Per cent.

Carbon reheated and cooled in sand	Bent double.
Specimen heated to a yellow heat and cooled in water	Broke at a bend of 25°.

Per cent.

Specimen reheated and cooled in sand	Bent double.
Specimen heated to a yellow heat and cooled in water	Bent double.

Per cent.

It must be added that the contents of silicon, sulphur and phosphorus were, on the average, nearly the same, both in Bessemer and Siemens-Martin steel.

Steel Plates in Russia.—According to the regulations now in force at the Russian government yards, the steel plates there used for shipbuilding or boiler-making purposes are to be rolled from ingots containing from 0.18 to 0.22 per cent. of carbon, and in the case of the plates for boiler-making, the test samples have to stand a tensile strain of not less than 26 or more than 30 tons per square inch, and must elongate 20 per cent. in a length of 8 inches before fracture. Shipbuilding plates must have a breaking strain of between 26 and 31 tons per square inch, and must elongate not less than 17 per cent. in a length of 8 inches. The hot and cold bending tests are the same as those of the English Admiralty for iron, but in the case of the cold bending tests the samples are to be placed for 20 to 30 minutes in a cooling mixture, giving a temperature of about zero Fahrenheit, and after this they must bend to the same angle as is required for iron at the ordinary temperature.

New Outlets for Connellsville Coke.—

Mr. Vanderbilt has made arrangements to enter the Connellsville coke regions with his system of roads. These now enter Pittsburgh over the Pittsburgh and Lake Erie, and from Pittsburgh a new line will be built extending up the Monongahela River to McKeesport, where that stream is crossed and the Youghiogheny followed for 43 miles up the left bank to New Haven, opposite Connellsville. The line will be 60 miles long. It will be put under contract at once, and it is hoped it will be finished in 12 months. This road will be of great importance to Pittsburgh. The rate on coke at present to that city is quite high for that class of freight, but, with this new road, competition will make a reasonable rate, and in so far benefit not only the furnaces of Pittsburgh, but those further west.

The following is a record of the furnaces in and out of blast in Great Britain on March 31:

Location of Furnaces.	Furnaces built.			Furnaces in blast.		
June 30, 1880.	Dec. 31, 1880.	March 31, 1881.	June 30, 1880.	Dec. 31, 1880.	March 31, 1881.	

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DRILL BRACE.

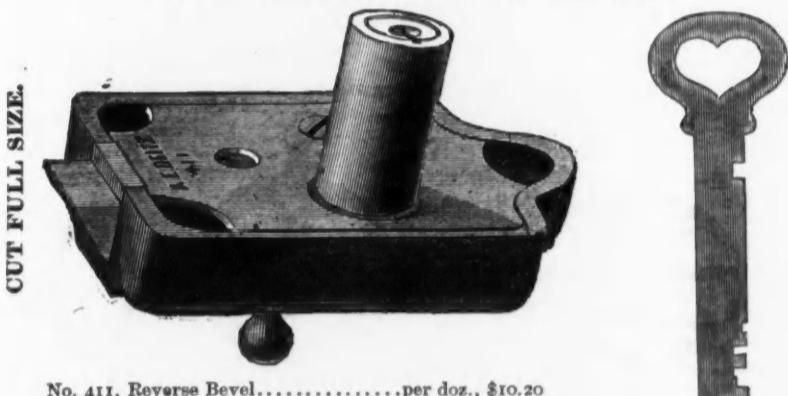
This is a 10-inch sweep Brace, with a gear-wheel speeded about three to one, to be used for drilling and also for boring in places where there is not room to revolve the Brace Sweep. By an ingenious device the large gear wheel can be put on at three different angles with the Brace Sweep, adapting it for use in narrow or cramped places. When not needed the gear wheel can be removed in one second, leaving a plain Brace. This Brace is made of steel, and is heavily nickel-plated, with rosewood handle and lignumvitae head. The jaws are of forged steel and will center and hold firmly Round Twist Drills from $\frac{1}{8}$ to 7-16 of an inch in diameter. Also, Square Shank Bits and Drills of all sizes. Also, Square and Flat Screw Driver Bits. In fact, it will hold perfectly tool shanks of any size or shape. There is no other chuck in existence which will do this. It is our purpose to furnish everything in the line of Bit Braces and Breast and Hand Drills of a style and quality superior to anything else in the market.

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Same discount as Breast Drills.

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EDWARD S. TABER, Treas.



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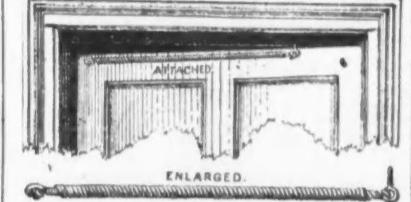
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Cuts less, and surpasses in Simplicity

Durability and Perfection all other

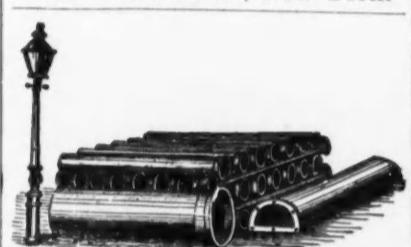
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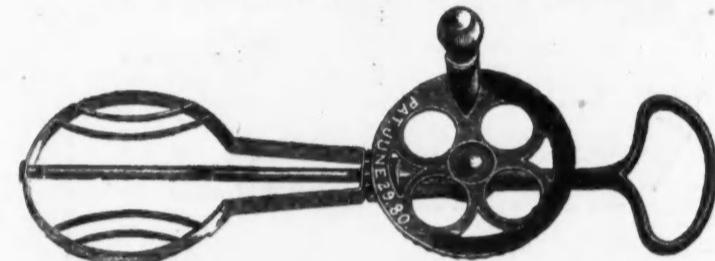
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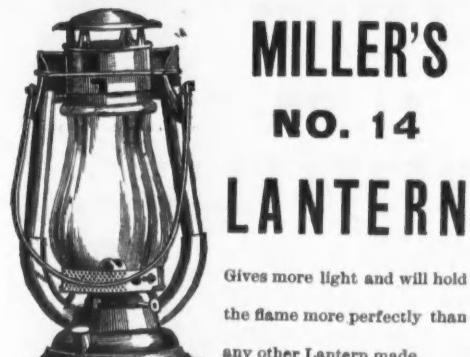
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With which the Sashes work as with weights, their application being at an expense of one-half the cost of ordinary weights, no boxes being required. The Sashes are Locked with the meeting rail, Locks being placed in the top sash. Price \$1 per set (four). Discount to the trade. In use over three years. Robt. B. Huguenin, Sole Maker, Hartford, Ct., U. S. A.

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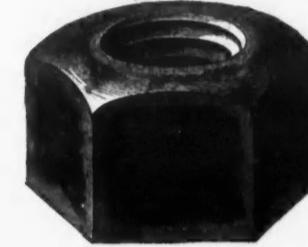
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Of Every Description,

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Albany, N. Y., Dec. 8, 1880.



To All Whom it May Concern:

To-day a decree in my suit against G. T. Fisher & Co., of Detroit, for an infringement of my patent, was made and entered, of which the following is an extract:

At a session of the Circuit Court of the United States for the Eastern District of Michigan, held at Detroit, &c., on Wednesday, the 8th day of December, 1880.

NELSON LYON, et al.

GUYON T. FISHER, et al.

It is ordered, adjudged and decreed, that the act entitled "An act for the relief of Nelson Lyon and Jerry M. James," passed by Congress and approved April 1, 1880, &c., is a good, valid and constitutional act.

That the original patent, bearing date July 9, 1872, and numbered 128,833, granted and issued to Joseph Barasaloux, Jeremiah H. James, and myself, when corrected, by the Acting Commissioner of Patents, is directed to be set aside as a good and valid patent.

That the said Joseph Barasaloux was the original and first inventor of the improvements in metallic stiffeners for boot and shoe heels mentioned and described in said letters patent.

That the Redford Letters Patent No. 128,833, granted to said Nelson Lyon for an improvement in metallic heel stiffeners for boots and shoes, originally patented, as aforesaid, is a good and valid patent; that said Lyon is exclusively possessed of said Letters Patent and the invention thereby secured.

That the defendants, G. T. Fisher & Co., and each of them, have infringed upon the said patents and upon the exclusive rights of G. T. Lyon, and each of them, in the use of the improvements in metallic stiffeners for boot and shoe heels.

The defendants, G. T. Fisher & Co., and each of them, have received all the profits, &c., they have made, and, in addition thereto all the damage he has suffered by reason of the infringements by the defendants, and also the costs, charges and disbursements in the action.

It is also further ordered, adjudged and decreed, that a perpetual injunction be issued against said defendants, according to the terms of the said complainant's bill.

You are also hereby notified that the perpetual injunction has been issued and served on the defendants.

All questions as to damages and settlements in relation to infringements under my patents must be addressed to and made with my attorney, WILLIAM H. KING, in my care at the above address.

NELSON LYON.

Wilson Bohannan,

Manufacturer of Patent

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For Railroad Switches, Freight Cars, and the Hard-
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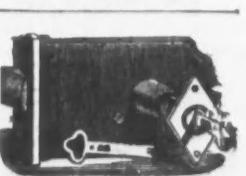
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RIGHT OR LEFT HAND.

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Extra Mild Center Steel, special for Taps,
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Address A. M. F. Watson, General Sales Agent.

STEEL Gautier Steel.
See Page 3.

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BENJAMIN ATHA & CO.,

Manufacturers of

BEST REFINED CAST STEEL

And grades of Steel specially adapted for Lathe Tools, Chisels and Taps and Dies.

Warranted most superior for TOOLS AND GRANITE ROCK DRILLS.

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Warranted Superior to any Steel in the Market, either

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Alumina..... 0.54

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Phosphoric Acid..... 0.04

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Combined Water..... 5.97

Moisture..... 9.43

100.45

Metallic Iron..... 59.79

The Sulphuric Acid exists as Sulphate of Lime

and is, in my opinion, not detrimental.

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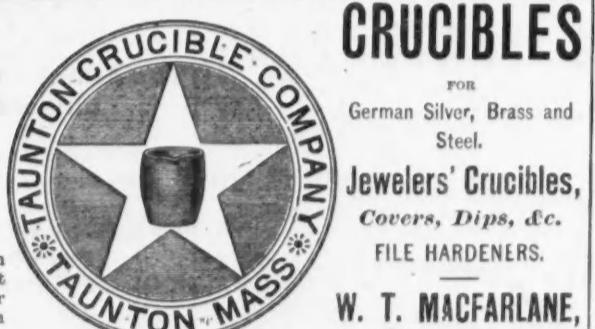
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JULY 1, AUGUST 1, SEPTEMBER 1, OCTOBER 1, NOVEMBER 6, DECEMBER 3 and 31, 1881, JANUARY 28, FEBRUARY 25, MARCH 25, APRIL 22, MAY 20 and JUNE 17, 1882.

This Supplement is published in

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Two-thirds page.....	22.00	24.75	27.50	One-sixth page.....	7.50	8.45
Half page.....	17.00	19.15	21.25	One-eighth page.....	6.20	7.00
One-third page.....	12.50	14.10	15.65	One-sixteenth page.....	3.20	3.40

Advertisers will do well to use illustrations freely. Where economy of space is an object, a left page illustrated and described in one language can be suitably described in four or more languages on the opposite or right page without illustrating.

THE WHOLE FOREIGN HARDWARE TRADE,

so far as our experience of twenty years is concerned, will be covered by The Foreign Supplement at least twice a year. Thus a Price List or Advertisement inserted in the Ironmonger and Foreign Supplement is a strikingly powerful and most efficient way of publicity, not to be compared with any of the other ordinary channels of communication.

July 14, 1881.

Steel.

WOLFF, KAHN & CO.,
MANUFACTURERS OF
Steel Wire

For All Purposes.

Special Finest CAST STEEL WIRE,

MARKET STEEL WIRE, PRIME COPPERED SPRING WIRE, TEMPERED AND UNTEMPERED STEEL WIRES, IN LONG LENGTHS, FOR CRINOLINE, CORSET, LOCK AND BRUSH MAKERS, AND ALL SPECIAL PURPOSES.

ALL KINDS OF FURNITURE SPRINGS.

IMPORTERS OF

**IRON, STEEL, & RAILS
OF EVERY DESCRIPTION.**WIRE RODS, PLAIN AND GALVANIZED WIRES, &c.,
GUN BARRELS, MOULDS, AND ORDNANCE.

Shipments in bond from American Ports and direct from Europe to all parts of the World.

EXPORTERS AND GENERAL MERCHANTS.

WORKS, PEEKSKILL, N. Y.

Direct all communications to the

OFFICE & WAREHOUSE, 93 John St., New York.

MILLER, METCALF & PARKIN,
Pittsburgh, Pa.,

Manufacturers of

CRESCENT STEEL,

In Bars, Sheets, Cold-Rolled Strips, &c.

Polished, Compressed Drill Rods and Wire.

Warranted equal to any imported in quality, finish and accuracy.

Also Common Grades.

Established 1810.

J. & RILEY CARR,
SHEFFIELD, ENGLAND.

Manufacturers of the "Celebrated

"DOG BRAND" FILES.

Also of Superior

STEEL

For Drills, Cold Chisels, Tools, Taps, Dies, &c.

COLD ROLLED STEEL for Clock Springs, Corsets, &c.
STEEL CAST STEEL for Springs, Saws, Welding and Stamping Cold, &c.
GERMAN, MACHINE, ENGLISH AND SWEDISH SPRING STEEL,

And all other descriptions for machinists and agricultural purposes.

Warehouse, 30 Gold Street, New York.

Near John Street.



HENRY MOORE, Agent.

S. & C. WARDLOW,

Sheffield, England,

Manufacturers of the Celebrated

**Cast and Double Shear
STEEL.**

In Bars, Sheets and Coils, for fine Pen and Pocket Cutlery, Table Knives, Mining Tools, Dies, Files, Clock and other Springs, and Tools of every variety.

Warehouse, 95 John Street, New York.

WILLIAM BROWN, Representative.

Cleveland Rolling Mill Co.,

Manufacturers of

BESSEMER STEEL

AND

Iron Rail and Fastenings,

SPRING STEEL

AND

WIRE OF ALL KINDS,

Tire, Axles and other forgings,

Buller Plate, Galvanized and Black Sheet Iron, Corrugated Roofing and Siding of Siemens-Martin, Bessemer Steel and Iron.

CLEVELAND, OHIO.

Western Agency,

New England Agency,

91 Lake Street, Chicago. 239 Franklin Street, Boston.

N. D. PRATT, Agent.

JOHN WALES & CO., Agents.

THE MIDVALE STEEL CO.,

NICETOWN, PHILADELPHIA.

Best Warranted Cast Steel for Machinists' Tools,

Taps, Dies, Punches, Shear Blades, Chipping Chisels and Granite Rock Drills,

Extra Mild Center Steel, special for Taps,

ALSO,

MACHINERY AND CAST SPRING STEEL, HEAVY AND LIGHT FORGINGS.

Warehouse, No. 12 North 5th St., Philadelphia.

Address A. M. Watson, General Sales Agent.

STEELGautier Steel.
See Page 3.**Steel.****NEWARK STEEL WORKS.**

BENJAMIN ATHA & CO.,

Manufacturers of

BEST REFINED CAST STEEL

And grades of Steel specially adapted for Lathe Tools, Chisels and Taps and Dies.

Warranted most superior for TOOLS AND GRANITE ROCK DRILLS

A full assortment of this universally approved OLD BRAND and other Steels for sale by

EDWARD FRITH & SON, Agents,

No. 241 Pearl St., New York.

LABELLE STEEL WORKS.**SMITH, SUTTON & CO.,**

Manufacturers of all kinds of

STEEL.

Also Springs, Axles, Rake Teeth, &c.

OFFICE & WORKS, Ridge, Lighthill & Belmont Sts., & Ohio River, Allegheny.

Post Office Address, Pittsburgh, Pa.

Represented at Boston by WETHERELL BROS., 31 Oliver St.; at Milwaukee by JOHN PRITCHETT, 43 to 49 West Water St.; at Chicago by S. D. KIRKLAND, 50 to 54 Michigan Ave.

TROY, N. Y.,

Office in New York City, 56 Broadway,

Manufacturers of

BESSEMER STEEL RAILS,

Machinery Steel, Merchant and Ship Iron.

HORSE SHOES.

SAM'L G. B. COOK & CO., Agents for Southern States,

67 and 69 German Street, Baltimore, Md.

FRANCIS HOBSON & SON

97 John Street, NEW YORK.

Sole Manufact'r's of "CHOICE" Extra Cast Steel.

Manufacturers of all Descriptions of Steel.

Manufacturers of Every Kind of Steel Wire.

Don Works, Sheffield, England.

CHAR. HUGILL, Agent.

THE

STEEL COMPANY OF SCOTLAND, LIMITED,

(SIEMENS' PROCESS.)

MANUFACTURERS OF

Steel Rails,

Steel Ship Plates,

Steel Blooms for Rails,

Steel Boiler Plates,

Steel Blooms for Wire,

Steel Angles,

Steel Wire Rods,

Steel Forgings,

Steel Locomotive Fire Boxes,

Steel Castings.

JAMES LEE & CO.,

Resident Agents for the United States,

72 Pine Street, New York.

GEO. SANDERSON & CO.,

MANUFACTURERS AND

Importers of STEEL,

Removed to 30 Gold Street, New York.

Particular attention is paid to quality and temper for FILES, SAWS, EDGE TOOLS, TABLE and POCKET CUTLERY, TOOLS, TAPS and DIES; also for COLD ROLLED STEEL for CLOCK SPRINGS, CORSET CLASPS, &c.

A Large Assorted Stock of JOHN ROTHERY'S FILES always on hand.

Warranted Superior to any Steel in the Market, either English or American, for every purpose.

Also,

Combination Chrome Steel and Iron for Safes, Jails and Deposit Vaults.

Send for Circular

and

Price List.

CHROME CAST STEEL.

Chrome Steel Works,
Kent Avenue and Keap Street,
BROOKLYN, E. D., N. Y.
Chicago Branch,
121 Lake Street,
MALCOLM McDOWELL, Manager.
Cincinnati Branch,
123 Central Avenue,
GEORGE KINSEY, Manager.

JOLIET STEEL COMPANY,

MANUFACTURERS OF

Steel Rails,

ALL WEIGHTS.

The Company Warrant its Rails equal in quality to any manufactured in the United States.

ALEX. J. LEITH, President. W. R. STIRLING, Treasurer. C. E. SARGENT, Secretary.

H. S. SMITH, General Sup't.

JOLIET.

Works, Joliet, Ill.

Steel.**R. MUSHET'S Special Steel**

FOR

LATHES, PLANERS, &c.

Turns out at least double work by increased speed and feed, and cuts harder metals than any other Steel. Neither hardening nor tempering required.

Solo Makers,

SAMUEL OSBORN & CO.,

Sheffield, England.

Represented in the United States by

B. M. JONES & CO.,

Nos. 11 & 13 Oliver Street, BOSTON.

NAYLOR & CO.,

99 John St., New York. 6 Oliver St., Boston, Mass.

W. R. HART, Agent,

208 S. Fourth St., Philadelphia, Pa.

THOS. J. HOYT, Agent,

709 North Second St., St. Louis, Mo.

Manufacturers of

STEEL COMPRESSED SHAFTING,**"Benzon" Homogeneous Plates**

For Boilers, Fire-boxes, &c.

AXLES, CRANK PINS, SPRING STEEL,

And all other kinds of

MARTIN-SIEMENS STEEL AND IRON

For Railroad purposes, &c.

IMPORTERS OF

IRON AND STEEL RAILS,

SWEDISH IRON,

Tin and Terne Plates and Metals.

H. & A. CARTER,

1a Laurence Pountney Hill,

Cannon Street, London, E. C.,

Iron and Steel Merchants,

Exporters of Iron and Steel Rails, Blooms, Spie-

geleisen, Pig Iron, Crop Ends, Old Rails and Scrap,

Iron Ore, &c. Sole agents for the sale of the Ven-

Dulce (Somorrostro) Iron Ore from the Magdalena

Mine. Shipping Port: Bilbao.

Analysis of "Magdalena" Ore.

Silica..... 4.05

Peroxide of Iron..... 84.60

Oxide of Manganese..... 1.65

Alumina..... 1.34

Lime..... 0.33

Magnesia..... trace

Phosphoric Acid..... 0.04

Steel.
CARNEGIE BROS. & CO., LIMITED,
 THOS. M. CARNEGIE,
 Chairman.
 PITTSBURGH, PA.
 D. A. STEWART,
 Treasurer.

EDGAR THOMSON STEEL WORKS DEPARTMENT.

Works at Bessemer Station, P. R. R.

Branch Office and P. O. Address, 48 Fifth Ave.,
 MANUFACTURERS OF

STEEL RAILS, BLOOMS & INGOTS

OF SUPERIOR QUALITY.

Union Iron Mills Department

Mills at Thirty-third St. and A. V. R. R.

Branch Office and P. O. Address, Thirty-third St.,
 MANUFACTURERS OF

STRUCTURAL IRON.

Bridge Iron, Iron Beams, Channel Bars, Car Truck Channels, Angles, Tees,
 Universal Mill Plates, Bar Iron, Light Steel and Iron Rails.

SPECIAL ATTENTION GIVEN UNUSUAL SHAPES AND SIZES.

Lithographs of sections and book of detailed information giving calculation of strain, &c., furnished
 to Engineers and Architects on application.

NEW YORK OFFICE: Room 32, No. 55 Broadway, N. Y.

NORTH CHICAGO ROLLING MILL CO.

ESTABLISHED 1857. CAPITAL, \$3,000,000. INCORPORATED 1869.

WORKS AT CHICAGO, ILL., AND MILWAUKEE, WIS.

MANUFACTURERS OF

**MERCHANT BAR, FISH PLATES, PIG METAL,
 IRON RAILS & BESSEMER STEEL RAILS.**

Present Annual Capacity of these Works.	Fish Plates.....	13,000 tons
	Merchant Bar.....	48,000 "
	Pig Metal.....	48,000 "
	Iron Rails.....	110,000 "
	Steel Rails.....	100,000 "
	Total Capacity per year.	403,000 "

OFFICES

17 Metropolitan Block, Chicago, Ill.

37 Mitchell Block, Milwaukee, Wis.

O. W. POTTER, President, CHICAGO.
 N. THAYER, Jr., Vice-President, BOSTON.
 S. CLEMENT, Treasurer, MILWAUKEE.
 R. C. HANNAH, Secretary, CHICAGO.

THE MONTOUR IRON & STEEL COMPANY.

WORKS AT DANVILLE, PA.

PIG IRON, T AND STREET RAILS.

A general assortment of mine and narrow gauge rails kept on hand, from which shipments can be made promptly.

W. E. COXE, President, F. P. HOWE, Gen'l Sup't, S. W. INGERSOLL, Treasurer, Reading, Pa. Danville, Pa. 227 South Fourth St., Philadelphia, Pa.

THE SIEMENS-ANDERSON STEEL CO.,

Successors to ANDERSON & CO.,

Manufacturers of

Crucible Tool, Cast Spring, Cast Plow, Iron Centre, Soft Centre, and Iron Back Plow, also Open Hearth Spring, Tire, Plow, Machinery, and

ALL DESCRIPTIONS OF STEEL.

And Sole Proprietors of the Siemens Direct Process in the United States.

President, THOS. T. FLAGLER, of the Holly Manufacturing Co., Lockport, N. Y. Treasurer, L. M. LAWSON, of Donnell, Lawson & Simpson, New York. Asst. Treasurer, S. A. COSGRAVE, Pittsburgh. Pa. Secretary, C. G. HILDRETH, New York. Vice President and General Manager, ROBT. J. ANDERSON, Pittsburgh. Attorneys, Messrs. ARTHUR, KNEVALS & RANSOM, New York.

BLACK LEAD STOPPERS

FOR
 Bessemer Converters and
 Siemens-Martin Furnace
 Ladles.

All the regular sizes in stock, with nozzles to fit each size. Special sizes or shapes made to order from sample or drawing.

ELBA IRON & BOLT CO., Limited.

MANUFACTURERS OF

MERCHANT BAR IRON,

Skelp Iron, Splice Bars, Railway Track Bolts, Car, Bridge, and Machinery Bolts, Nuts, &c.

We invite the attention of RAILROAD MEN especially to our make of SPLICE BARS and Track Bolts. Using the best brands of REFINED IRON and paying close attention to the finish of our manufactures, we are enabled to offer our patrons BOLTS, NUTS, SPLICE BARS, &c., of excellent quality. Our works have been enlarged within a few years; all orders are now executed with promptness; all our work guaranteed.

SEND FOR PRICE LISTS AND INFORMATION TO

ELBA IRON & BOLT CO., Limited, Pittsburgh, Pa.

BELLAIRE NAIL WORKS,

PIC IRON AND NAILS,

Manufacture the Celebrated Brand of

BELLAIRE NAILS,

Office and Works, Bellaire, Ohio.

THE "WARNER" DOOR SPRINGS

are the most simple, most effective and most convenient ever introduced, and the immense sale we are having shows their great popularity and superiority.

There never was a Spring made that is so durable, so complete in its action, operating with a uniform pressure, holding the door tight when closed, and allowing it to open without increasing the pressure at any point.

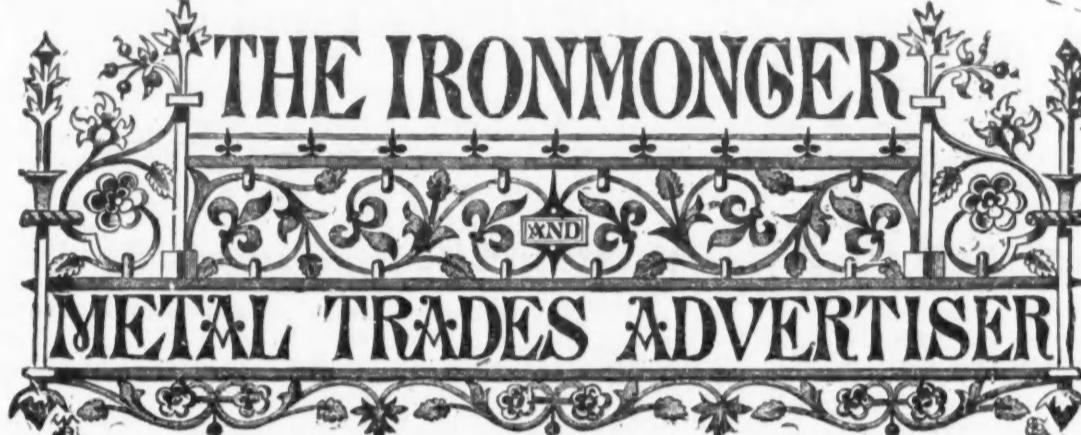
When the door is opened about 130 degrees of a circle, it will press and hold it open. The Spring is easily unhooked and rehooked—in an instant—from the door and also from the jamb, without removing a screw or pin.

This is a Convenience Possessed by no other Spring in the Market.

We are making this season three sizes, viz:
 No. 1 For Screen or Light Storm Doors.
 No. 2 For Medium Doors.
 No. 3 For Heavy Doors.
 They are for sale by most of the prominent jobbers of the United States and Canada. Correspondence solicited.

FREDERIC BARTLETT,
 FREEPORT, ILLINOIS.

ESTABLISHED IN 1859.



PUBLISHED EVERY SATURDAY.

THE OLDEST AND CHIEF REPRESENTATIVE OF THE IRON, HARDWARE AND METAL TRADES.

OFFICE: 44a CANNON STREET, LONDON, E.C.

ADVERTISEMENTS AND SUBSCRIPTIONS ARE RECEIVED AT THE VARIOUS OFFICES OF "THE IRON AGE," NAMELY:

NEW YORK OFFICE: DAVID WILLIAMS, Publisher of *The Iron Age*, 83 Reade street, who will, on receipt of application, supply specimen copies free.

PITTSBURGH OFFICE: 77 Fourth Avenue—JOS. D. WEEKS, Manager and Associate Editor. PHILADELPHIA OFFICE: 220 South Fourth Street—THOMAS HOBSON Manager.

CINCINNATI OFFICE: Builders' Exchange—T. T. MOORE, Manager. SOUTHERN OFFICE: Cor. Eighth and Market Streets, Chattanooga, Tenn.—S. B. LOWE, Manager.

SPECIAL FEATURES.

Notes of Novelties.—This is a department of the journal always watched with interest by the trade, as it contains an account, from week to week, of the novelties which manufacturers and inventors are introducing to the notice of the trade. These articles are freely illustrated.

Special Correspondents.—The ironmonger has a deserved reputation for its special correspondence from all the principal Continental, British and manufacturing centers. The writers are gentlemen holding important positions in the districts with which they are connected, and possess facilities for acquiring information specially suited for the columns of the *Ironmonger*. *The Week*, *Legal News*, *Trade Notes*, *Bankruptcies*, *Foreign Notes*, *Colonial Jottings*, *Merchants' Circulars*, &c., are each departments of the journal, containing a digest of all matters of direct interest to the Iron, Hardware and Metal Trades. In addition to the above, there is a carefully classified list of Patents, together with Editorial Notes, French, Belgian and other Special Correspondence.

SUBSCRIPTIONS

to the *Ironmonger and Metal Trades' Advertiser*, with which is sent every fourth week the Foreign Supplement (see below), may commence from any date, but are not received for less than a year complete. The rate is \$5 per annum, inclusive of postage to any part of the world outside Great Britain. To every subscriber is presented, free, in the course of his year, a handsome and useful *Ironmongers' Diary and Text Book*, a work sold to non-subscribers at 75 cents.

ADVERTISEMENTS

are inserted in the *Ironmonger and Metal Trades' Advertiser* at the subjoined rates, from which no variation can be made on any ground whatever.

SIZE OF PAGE—NINE INCHES DEEP BY SIX INCHES WIDE.

One Advertisement of every Series of 13 Monthly, 27 Fortnightly, or 53 Weekly, will be inserted in the *Ironmongers' Diary and Text Book*, published toward the end of each year, and presented to every subscriber.

	53 INSERTIONS, each net.	27 INSERTIONS, each net.	13 INSERTIONS, each net.	7 INSERTIONS, each net.	3 INSERTIONS, each net.	I INSERTION, not.
One page.....	Gold. \$20.00	Gold. \$22.50	Gold. \$25.00	Gold. \$30.00	Gold. \$35.00	Gold. \$40.00
Two-thirds page.....	15.00	16.90	18.75	22.50	26.25	37.50
Half page.....	11.00	12.40	13.75	16.50	19.25	27.50
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Quarter page.....	6.40	7.25	8.00	9.60	11.20	16.00
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SPECIAL ISSUES.

In the spring and autumn of each year there is published a Special Issue, the circulation of which is not less than **Twelve Thousand (12,000)** copies.

THE IRONMONGERS' DIARY AND TEXT BOOK.

This is an annual, presented free to every Subcriber to the *IRONMONGER AND METAL TRADES' ADVERTISER*. It contains a large number of ruled skeleton pages for diary and other entries, and in addition much useful reference information, varied from year to year. It is handsomely bound in cloth, gilt; and as copies are used in thousands of establishments for a whole year, it is obviously a medium of exceptional value for advertisements. Sold to non-subscribers at 75 cents.

THE FOREIGN SUPPLEMENT,

With which is incorporated *The Universal Engineer*,

is published every fourth week in connection with the extensive and world-wide circulation of the *Ironmonger* itself. The dates of its publication for the next twelve months will be as follows:

JULY 23, AUGUST 23, SEPTEMBER 17, OCTOBER 8, NOVEMBER 6, DECEMBER 3 and 31, 1881, JANUARY 28, FEBRUARY 25, MARCH 25, APRIL 22, MAY 20 and JUNE 17, 1882.

This Supplement is published in

FOUR LEADING COMMERCIAL LANGUAGES

of the world, including English, and is sent to all the countries where they are spoken, thus placing the contents of the *Ironmonger* not only within reach but in the native language of eighty millions of German, forty-two millions of French, twenty-eight millions of Italian, and fifty-one millions of Spanish speaking people; or, in all, over two hundred millions of inhabitants in the principal nations where the best purchasers of manufactured goods are to be found.

Advertisements are inserted in any language at the following

MODERATE TARIFF.

Size of Page—13½ Inches Deep by 9½ Inches Wide.

	13 INSERTIONS, each net.	7 INSERTIONS, each net.	3 INSERTIONS, each net.	13 INSERTIONS, each net.	7 INSERTIONS, each net.	1 INSERTION, each net.
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Two-thirds page.....	22.00	24.75	27.50	One-sixth page.....	8.45	9.40
Half page.....	17.00	19.15	21.25	One-eighth page.....	6.20	7.00
One-third page.....	12.50	14.10	15.65	One-sixteenth page.....	3.20	3.40

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THE WHOLE FOREIGN HARDWARE TRADE,

so far as our experience of twenty years is concerned, will be covered by <i

July 14, 1881.

B. KREISCHER & SONS,
FIRE BRICK.
BEST AND CHEAPEST.
Established 1845.
Office, foot of Houston Street, East River,
NEW YORK.

NEWTON & CO.,
ALBANY, N. Y., Manufacturers of
FIRE BRICK
Stove Linings,
Range and Heater Linings

Cylinder Brick, &c., &c.
M. D. Valentine & Bro

Manufacturers of
FIRE BRICK
And Furnace Blocks
DRAIN PIPE & LAND TILE.

Woodbridge, - - - N. J.

BORGNER & O'BRIEN,
Manufacturers

FIRE BRICK
AND
Edge Pressed Furnace Blocks,
CLAY RETORTS, TILES, &c.
Twenty-third Street,
Above Race, PHILADELPHIA.

Twenty years' practical Experience.

BROOKLYN
Clay Retort and Fire Brick Works,
(EDWARD D. WHITE & CO.)

Manufacturers of Clay Retorts, Fire Brick,
Gas House and other Tile.

VAN DYKE, ELIZABETH, RICHARDS & PARTITION STS.
Office, 88 Van Dyke St., Brooklyn, N. Y.

WATSON FIRE BRICK CO.,
ESTABLISHED 1856.

Successors to JOHN R. WATSON, Perth Amboy, New Jersey.

Manufacturers of

FIRE BRICK,
OR ROLLING MILLS, BLAST FURNACES, FOUNDRIES, GAS WORKS, LIME KILNS, TANNERS, BOILER AND GRATE SETTING, GLASS WORKS, &c.

Fire Clays, Fire Sand, and Kaolin for Sale.

HENRY MAURER,
Proprietor of the
Excelsior Fire Brick & Clay
Retort Works.

Manufacturer of FIRE BRICK, HOLLOW
BRICK AND CLAY RETORTS.

WORKS: PERTH AMBOY, NEW JERSEY.

Office & Depot, 418 to 422 East 23d St., N. Y.

TROY FIRE BRICK WORKS,

Troy, N. Y.

JAMES OSTRANDER & SON,

ESTABLISHED 1858,

Manufacturers of

FIRE BRICK,

Tiles, Blast Furnace Blocks, &c. Miners and

Dealers in Woodbridge Fire Clay and Sand, and Staten Island Kaolin.

Established 1864.

GARDNER BROTHERS,

Manufacturers of

STANDARD SAVAGE FIRE BRICK,

TILE & FURNACE BLOCKS,

OF ALL SHAPES AND SIZES.

Clay Gas Retorts and Retort Settings, and

Miners and Shippers of Fire Clay.

OFFICE: 115 Smithfield St., Pittsburgh, Pa.

WORKS: Mt. Savage Junction, Md., and Lockport, Pa.

HALL & SONS,

FIRE BRICK,

Buffalo, N. Y.

CHAS. D. COLSON,

FIRE BRICK,

Foundry Facings, Sand, Tools and Supplies.

CHICAGO, ILL.

UNION MINING COMPANY.

Mount Savage Fire Brick.

EDWARD J. ETTING, Agent,
No. 230 South Third St., Philadelphia, Pa.

MILLER'S BRICK PRESSES

(Established 1844),

FIRE and RED BRICK,

And Brickmakers' Tools in General.

SAM'L P. MILLER & SON,

309 South 5th St., Philadelphia.

GEO. M. EDDY & CO.,

Manufacturers of

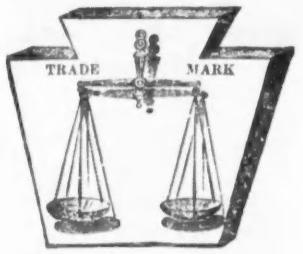
Measuring Tapes

Of Cotton, Linen & Steel.

FOR ALL PURPOSES.

351 to 353 Classon Ave., Brooklyn, N. Y.

HENRY DISSTON & SONS,



KEYSTONE

SAW, TOOL, STEEL AND FILE WORKS,

Front and Laurel Streets,

PHILADELPHIA.

We have appointed

HAMMACHER & DELIUS, of Hamburg, Germany,

AGENTS FOR THE SALE OF OUR GOODS.

Any orders sent them will have the same prompt and careful attention as though they were sent us direct. Hoping you will favor them with your orders, we are,

Yours truly,

HENRY DISSTON & SONS.

Escutcheon Pins, Small Rivets and Screws,

And Specialties in this line made to order by

BLAKE & JOHNSON,
WATERBURY, CONN.

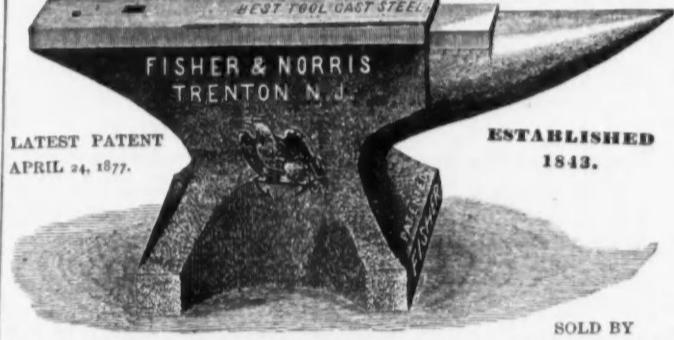
THE "EAGLE" ANVIL.

WARRANTED!!

Better than the Best English Anvil.

Face in one piece, of BEST TOOL CAST STEEL, PERFECTLY WELDED, perfectly true; of hardest temper and never to come off or "settle." It does not bounce the hammer back, and therefore can do more work with lighter hammer. Horn of tough untempered steel, never to break or bend. Only Anvil made in United States fully warranted as above. None genuine without our trade-mark.

N. B.—That the "Eagle" Anvil is the **only** one made at Trenton, New Jersey, and it must not be mistaken for an Anvil in the market called Trenton, but which is really of foreign manufacture, and an imported imitation of the English Anvil.



ESTABLISHED
1843.

SOLD BY

New York—RUSSELL & ERWIN MANUFACTURING COMPANY, DURRIGE & McCARTY, TENNIS & WILSON.
Philadelphia—JAMES C. HAND & CO., BOSTON—GEORGE H. GRAY & DANFORTH.
Baltimore—W. H. COLE & SONS, JOHN R. KELSO, JR.
Louisville—W. R. BELKNAP & CO.
Cincinnati—POST & CO.
Cleveland—THE LAKE ERIE IRON CO.

NEWTON'S PATENT STEAM TRAP AND GRATE BARS,

MANUFACTURED BY

PROVIDENCE STEAM TRAP CO., Providence, R. I.

Agents Wanted for Different Locations.

See The Iron Age first issue of each month.

ROCKING BLOCK GRATE,

Williams' Patent,

J. Q. MAYNARD,

General Agent.



97 Liberty Street, NEW YORK.

Fire level. Accumulation of cinders impossible. No cleaning out of fires during the day. Parts easily and cheaply replaced. Seventy per cent. of air space. Thirty days' trial. Send for circular.

GREEN'S PURE SILICA FIRE BRICK,

MADE BY

LACLEDE FIRE BRICK MANUFACTURING CO.,

SPECIALLY ADAPTED FOR

Pernot and Siemens Open Hearth
Steel Furnaces and for Glass Furnaces.

Office, 901 Pine St., St. Louis, Mo.

COXE BROS. & CO.,

Cross Creek Lehigh Coal.

The Purity and Strength of this Coal especially adapt it for the working of Iron and Metals.

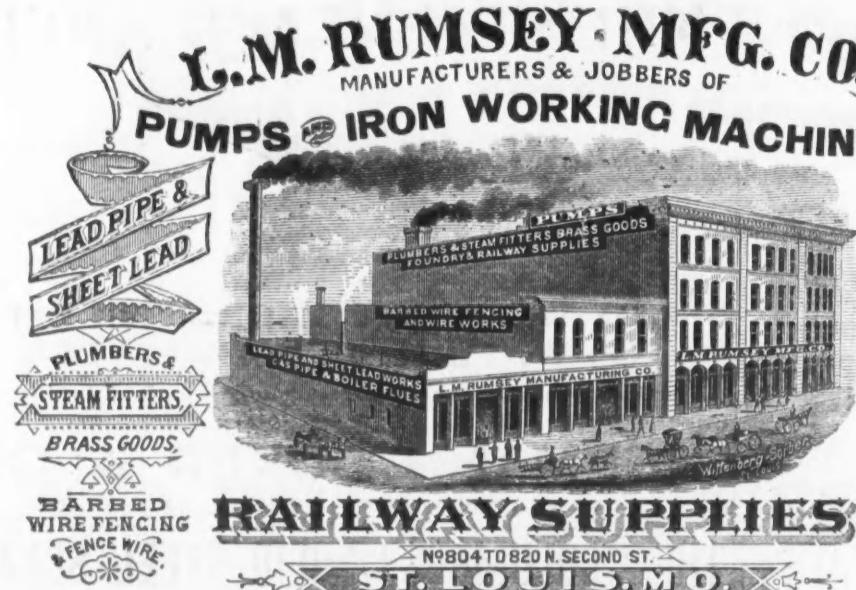
GENERAL OFFICE, Room 12 Trinity Building, 111 Broadway, New York
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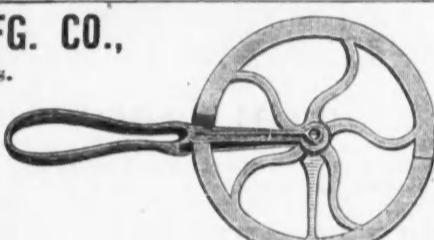


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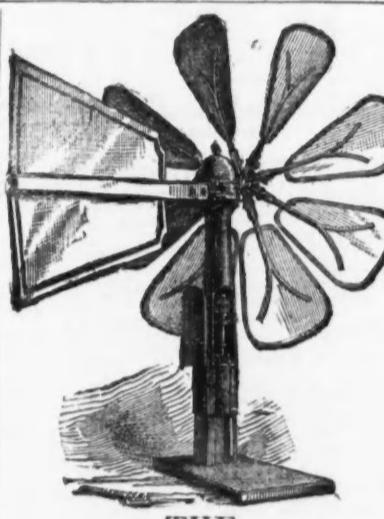
Bolt Cutters for hand or power; Lightning
Screw Plates, cutting from wire sizes to $\frac{1}{2}$ in.
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Green River Drills, hand or power.
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Special Screw Plates for use in stock or the
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Water Driven to any Height and Distance
by Compressed Air.

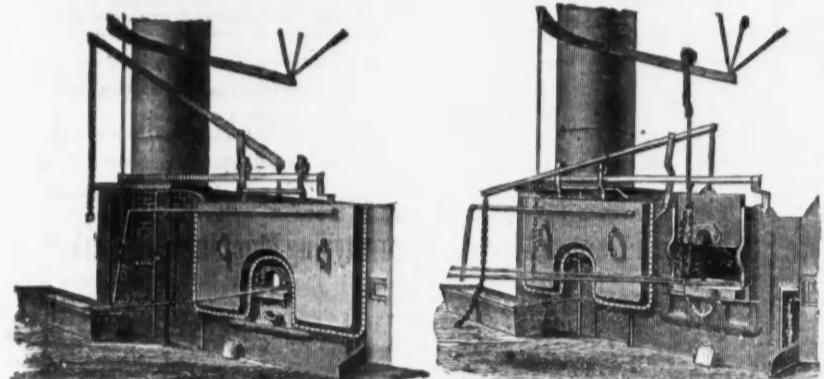
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Faucets, &c. Plenty of Fresh Water for Stock on
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Ranch Tanks, &c. for Mining purposes. For Circu-
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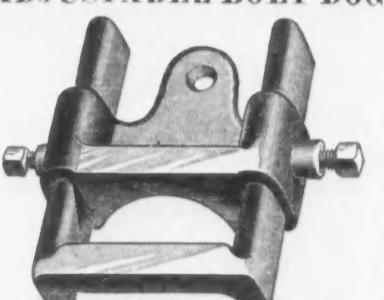
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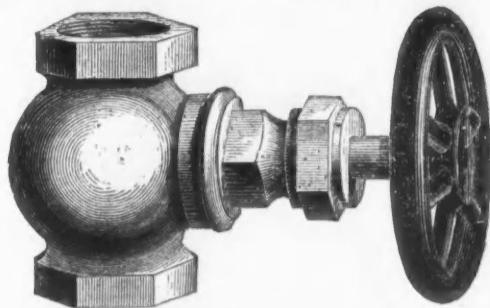


Will hold all sizes of bolts up to $\frac{1}{2}$ inches; is
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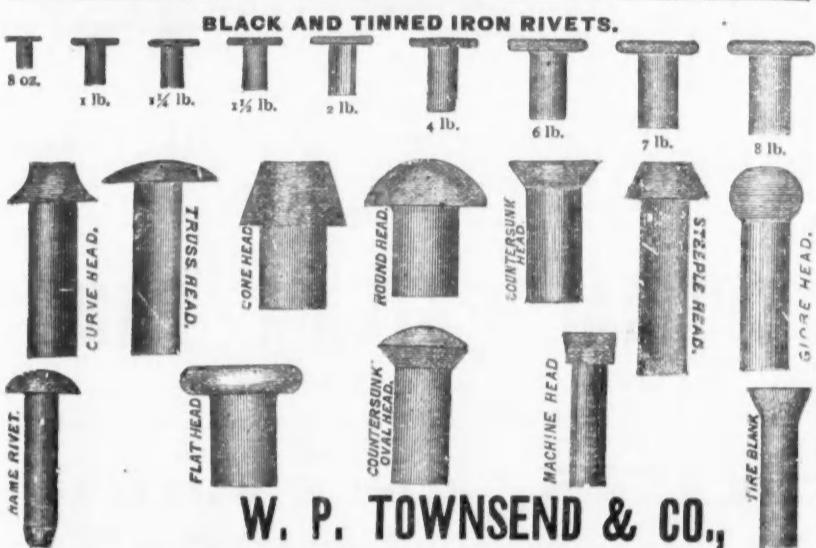
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Auvils. —"Eagle American".....	\$10 per cwt.
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L'Hommelieu's Ship Auger.....	\$10 per cwt.
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Cook's Bits.....	\$10 per cwt.
Sheppard's Double-cut Bits.....	\$10 per cwt.
" Gimlets.....	\$10 per cwt.
Stewart's Extension Hollow Augers.....	\$10 per cwt.
Bonney's Extension Hollow Augers.....	\$10 per cwt.
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Axes. —Blue Jackets.....	per doz. 9.00
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Dowse Boys.....	per doz. 9.00
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" 34 in., No. C.....	per doz. \$2.00
" 31 or 34 in., No. C.....	per doz. 1.15
Axle Clips.	per doz. 10.00
Balances. —Chatillon's.....	per doz. 10.00
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Cast Angle (for Anti-Friction Hangers).....	per ft. 30
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Wrought.....	per ft. 30
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Japanned M. R. & D., reduced list, 1879.....	per doz. 4.00
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No. 6 Fastas.....	per C sets 6.00
Venizel Fastas.....	per C sets 6.00
Shuttle Fastas.....	per C sets 6.00
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Phoenix Adjustable.....	per doz. 8.00
Bolts. —Norway Iron Carriage.....	per doz. 8.00
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Earthenware, 1 lb. each.....	per set 2.25
Eagle Angle each.....	per set 2.25
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Spigot Braces.....	per doz. 10.00
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New Rogers, all iron.....	per doz. 10.00
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Griffith's patent.....	per gross 750
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" Boston Finish.....	per doz. 10.00
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" No. 2.....	per doz. 8.00
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" NO. 3.....	per doz. 8.00
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Chair.....	per pair 1.00
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" 5 in.	per doz. 10.00
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Copper Rivets. —	
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No. 35, 3 ft. " with snap.....	per doz. 3.00
No. 40, 3 ft. " with snap.....	per doz. 3.00
No. 45, 3 ft. " with snap.....	per doz. 4.00
No. 50, 4 ft. No. 4 " with toggle.....	per doz. 4.00
No. 55, 4 ft. " with snap.....	per doz. 4.00
No. 60, 4 ft. " 3 " with toggle.....	per doz. 4.00
No. 65, 4 ft. " 3 " with snap.....	per doz. 4.00
No. 70, 4 ft. " 3 " with snap.....	per doz. 4.00
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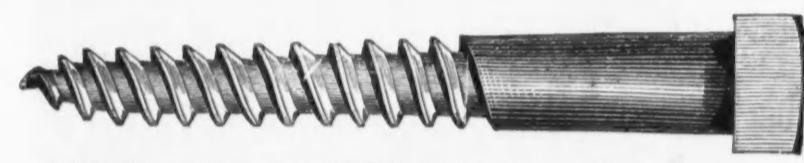
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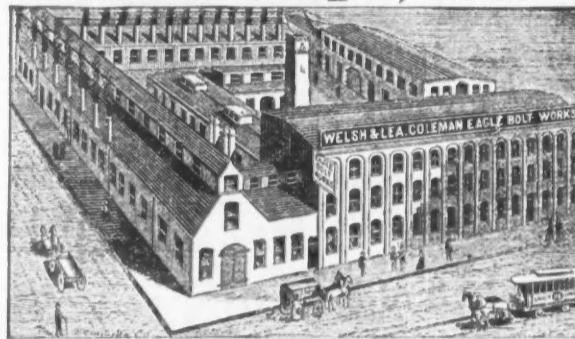
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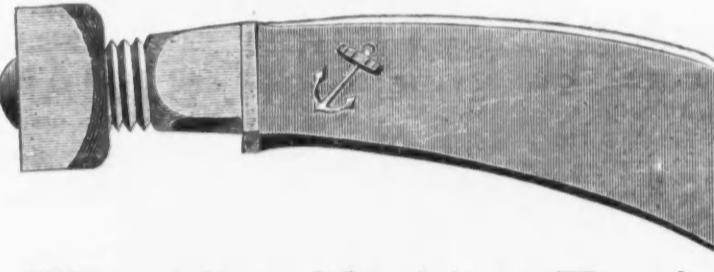
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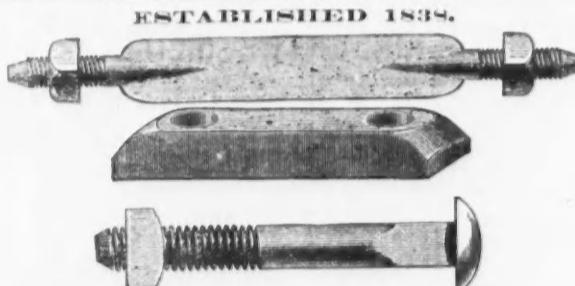
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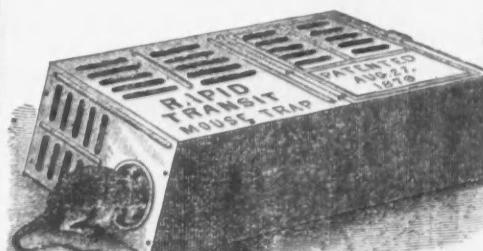
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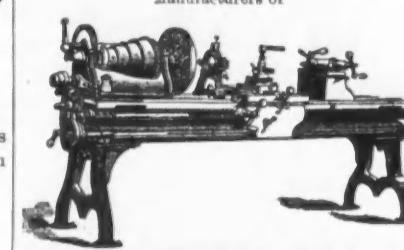
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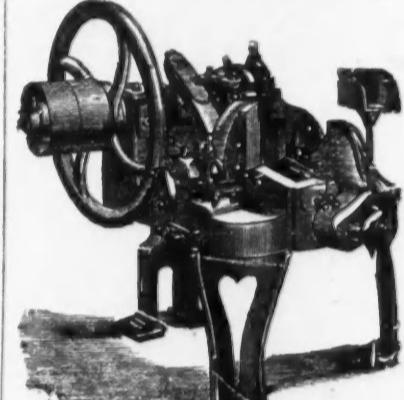
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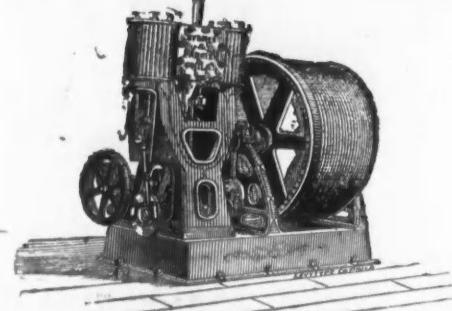
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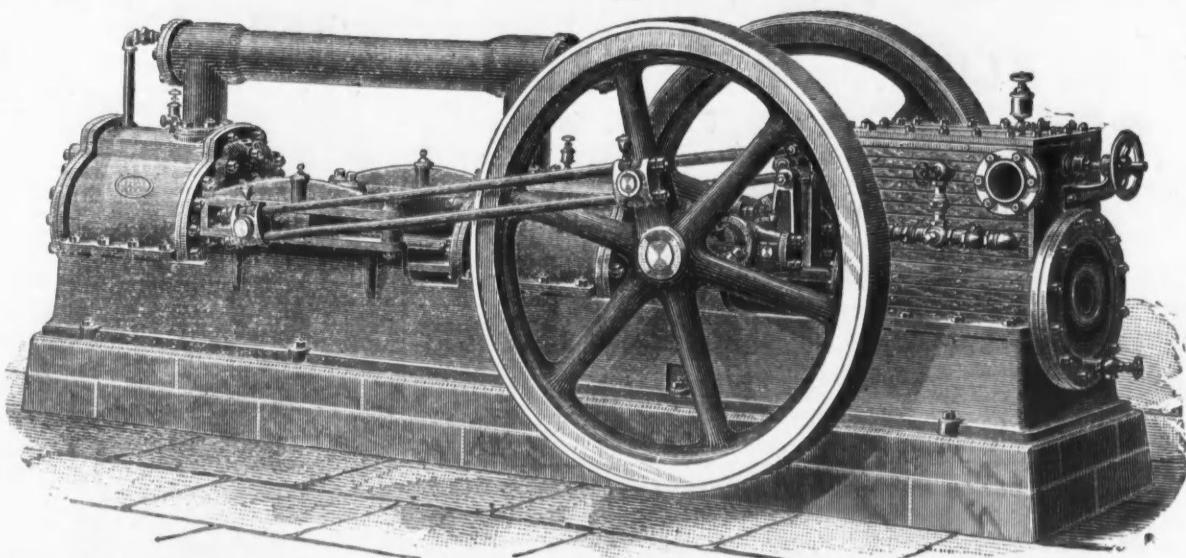
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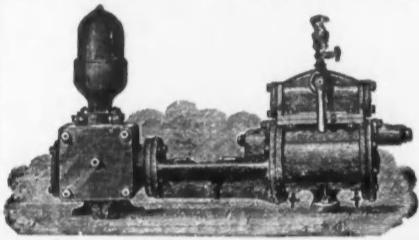
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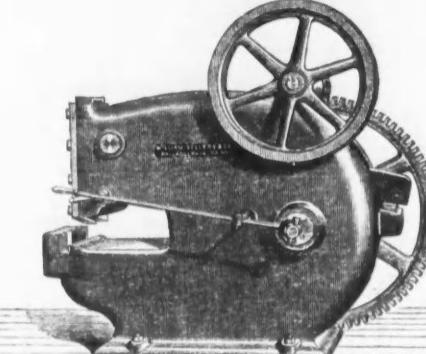
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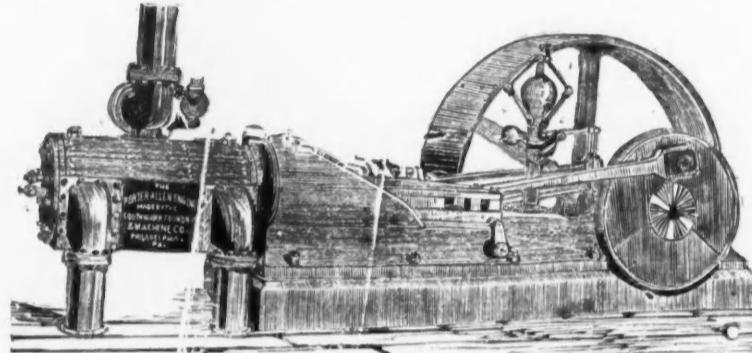
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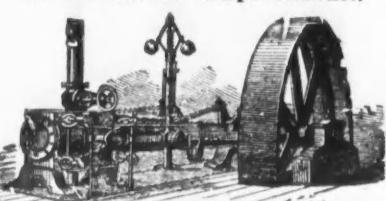
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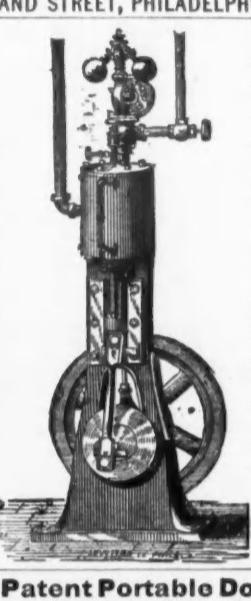
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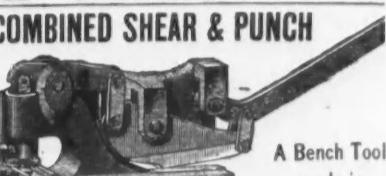
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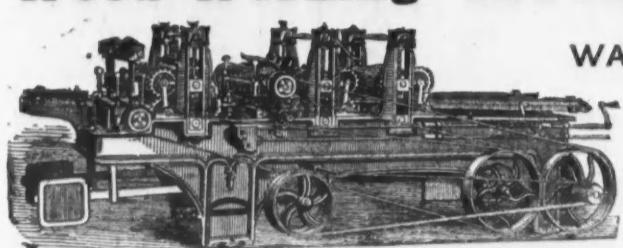
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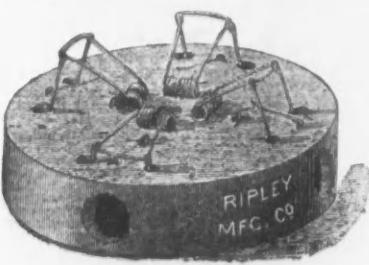
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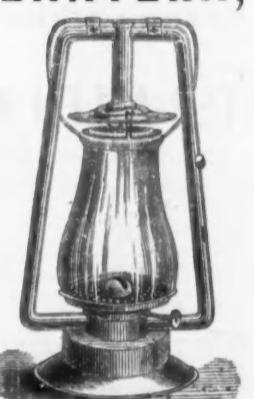
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